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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

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Orthodontic Practice—*Simon*
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AMERICAN DENTAL ASSOCIATION ORGANIZED 1859 INCORPORATED 1922

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PERCY R. HOWE. A.B., D.D.S., Boston, Massachusetts
President-Elect of the American Dental Association

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Original Communications

PRESIDENT'S ADDRESS*

By HENRY L. BANZHAF, B.Sc., D.D.S., F.A.C.D., Milwaukee, Wisconsin

THE American Dental Association is one of the most important of the existing agencies for the advancement of the public welfare. Its influence is already mighty, its potential effectiveness for good is almost limitless.

I make these statements advisedly after an experience which, though at times arduous and exacting, has had many compensations in the fine spirit of cooperation, appreciation and understanding that was everywhere extended to me by the thirty-three thousand five hundred members who comprise this great professional brotherhood. It seems but yesterday that I accepted my responsibility from the House of Delegates, and yet, during this period, I have, in the performance of my duties, traveled more than twenty-five thousand miles, including trips to the Pacific Coast states, the South and New England, and have delivered or read more than sixty addresses and papers. I am glad to be able to testify that, in each of my contacts with our wonderful membership, I have received infinitely more inspiration and information than I could possibly have hoped to awaken or impart.

It is inevitable that your President must deliver an annual address at this place in the program. Since I have had an excellent opportunity to meet a large number of our members during the year, I have, after some deliberation, come to the conclusion that it might prove of interest to devote this address to a résumé of the collective opinions of the entire membership on matters of

*Read before the First General Session of the American Dental Association, Oct. 25, 1927.

general interest to the profession rather than to a recital of my own beliefs and recommendations. I hope that the spiritual enthusiasm and liberal education that I received in my personal contacts with dentists in all parts of the country during the past year will, in some measure at least, be reflected in this paper. My object, therefore, will be merely to pass on to you in brief, concentrated form an outline of what has been impressed on me during the year.

After all, our chief purpose in coming to this convention in this wonderful, progressive metropolis of the State of Michigan is to exchange experiences and opinions. We want to learn from one another. "Happiness," said Napoleon, while he was impatiently waiting for his appointment to the command of the Army of Northern Italy, "consists in the fullest development of one's talents." While you may express dissatisfaction with the inadequacy of this definition, it is nevertheless a fact that most of us here assembled are happy because we are about to receive many valuable ideas and inspirations during the course of the week, and we are joyful in anticipating further development of our abilities so that we may serve our patients more effectively. It is a significant fact that the members of our profession who comprehend the value of these meetings are also, as a direct effect of the mental and professional improvement they experience, financially able as well as eager to attend the national meeting year after year. They feel that they would not be keeping faith with the patients entrusted to their care if they missed the enthusiasm and inspiration of personal contact with the leading members of this great service organization.

Before I present a composite picture of the ideas that are predominant among dentists today, please allow me just one digression. I want to express my personal appreciation to you who, through your representatives in the House of Delegates, chose Detroit for this meeting. Located but a short distance from the great educational institution that I love as my Alma Mater, where kind old Dr. Jonathan Taft and Dr. J. A. Watling extended the personal encouragement and direction that I so sorely needed; here, where shortly after graduation, in an attempt to add to my meager supply of professional knowledge, I spent three fruitful months as a student in porcelain dental art in the office of the late Dr. Charles Land, the grandfather of Col. Charles A. Lindbergh, long before that famous son of Michigan was born; here, where the spirit of modern progress predominates as in no other American city, I am personally happy to find myself today among familiar surroundings and loving friends, and I would be remiss if I did not express my heartfelt gratification.

And now without further preliminaries, I shall plunge at once into my report. I shall present a résumé of collective opinions without suggesting any course of action, having reserved my recommendations for my address before the legislative branch of this body, the House of Delegates. I hope, however, that you will derive the same enthusiasm from my remarks as I did when, in assembling my notes, I realized the magnitude of the work in which our association and its component parts are engaged, and the unselfish spirit of service that obtains generally throughout our membership. It will become

more and more evident to you, as I stated at the outset, that the American Dental Association is dedicated primarily to the public service—that its purposes are broad and altruistic, and in no wise narrow and selfish.

Throughout the length and breadth of the land, I find dentists everywhere focusing on problems of prevention the same degree of attention that they are giving to problems of replacement, restoration and cure. Everywhere the public is interested in the prevention of disease, of crime and of ignorance. Prevention is the watchword of the day. We are interested in the prevention of future wars, of floods, of forest fires, of accidents and of an endless number of avoidable disasters and unhappy experiences. Education of the youth in right ways of living, physically as well as mentally and morally, is now the chief concern of a large number of organizations in this country. Health departments, school physicians, school dentists, school nurses, school dental hygienists, playground facilities, natatoriums, Sunday schools or church schools where religion is taught, evening schools, continuation schools and such organizations as the Boy Scouts, Girl Scouts and Campfire Girls are all agents or agencies of prevention. The public press, too, wields a mighty influence and can usually be depended on to utilize its power enthusiastically whenever and wherever a movement for the public good is suggested.

In a certain sense, dentists as individuals as well as a profession have always been foremost champions of prevention. This is true because every operation which has for its object the establishment or maintenance of the health of the teeth and mouth is in its largest meaning preventive. The functions of the other organs of the body are seriously disturbed unless the organs of mastication are doing their work effectively. During the past fifty years at least, the members of the dental profession have advised periodical mouth examinations for their patients so that incipient tooth decay might be discovered before it progressed to the stage where extensive restorations and replacements would become necessary. Lately, the medical profession also has begun to stress the importance of frequent physical examinations while the patient is still in a state of health. The wear and tear of the body by the intensive life of today demands frequent physical examinations, if health is to be preserved; and for this reason all of the important divisions of health service are now stressing prevention. As an example of this, let me refer to a resolution passed by the American Society of Orthodontists at its annual meeting held in May of this year in which the principles relating to dental health are enumerated and the necessity for prevention is emphasized. Also, let me call your attention to the fact that the present administration of the American Dental Association has adopted the slogan, "Prevention First," in order to keep before the members of the profession this most worthy of all their activities.

We are all familiar with the statistics prepared by Prof. Irving Fisher, of Yale University, who computes that, of the 1,500,000 deaths that occur annually in the United States, 600,000 might have been postponed if proper preventive measures had been taken, and that the annual financial loss from this

cause is in excess of two billion dollars. Statistics taken from other sources show that an appallingly large number of the youth of our land are affected with various forms of malnutrition, organic diseases, nervous disorders, spinal curvature, enlarged glands in the region of the neck; enlarged tonsils and adenoids and defective hearing or vision. Of immediate interest to us as dentists is the fact that approximately half of the number of school children in the fourth and fifth grade have enough decayed and malposed teeth to interfere seriously with their physical well-being. In fact, it has been found that the average number of partially carious or decayed teeth is seven for each mouth; and, of the seven, an average of one tooth has had the professional attention of a dentist.

These conditions would indeed be hopelessly appalling and discouraging if it were impossible to do something about them. It is a comfort to know that at present much is being done, not only by our own profession, through various activities and means that will be mentioned later, but also by the medical profession and public health agencies, in the reduction of infectious diseases, and a great deal more will be done in the future to banish all of these preventable diseases. Statistics show that there is a decrease in the deaths due to infectious diseases and, in some sections, a decrease in infant mortality. Deaths due to chronic diseases, cancer and diseases of the heart, kidney and blood vessels are on the increase. In a statement made recently, Franklin H. Martin, director-general of the American College of Surgeons, said that scientific medicine is now going to center its attention on the "fifty per cent who die in the early forties as a result of preventable diseases such as kidney disease, heart disease and cancer." Particularly in the prevention of cancer, the dentist can perform a great service for mankind, if he will be constantly on the alert for small tissue-growths or abnormalities that may later develop into fatal malignancy. All suspicious irregularities should be reported to a competent surgeon or pathologist at once, in order that the modern method of removing the growth, if that is indicated, may be followed as a preventive measure. The fact that an increasing number of patients are visiting the dentist periodically favors the extension of such advisory health service. Until, as William J. Mayo believes will soon be possible, science finds a way to immunize against cancer, much of the responsibility for the detection of the incipient stages of this dread disease must be borne by the dentist. I am pleased to report that, in my contacts with dental groups during the past year, dentists as a whole are taking a deep interest in this important problem and are studying it generally, with a view to becoming more proficient in recognizing all abnormalities, however slight they may be. Furthermore, dental schools are beginning to see the need of giving effectual instruction along this line.

Another division of the problem of prevention that is attracting unusual interest among dentists is diet. I believe that the study of food and the education of the public with respect to correct habits of diet are fundamental in our fight against dental caries and other forms of oral disease. I find that many of the leaders of our profession are in agreement with me in

this opinion. I believe that it will eventually be demonstrated that much of the disease of the oral cavity, and other parts of the digestive tract, as well as organs of elimination, is caused by excessive consumption of free sugars and of other foodstuffs, such as white flour or polished rice, from which most of the mineral and vitamin content as well as the roughage has been removed by means of refining processes. An increasing number in the dental profession are informing themselves on the subject of diet, and are already in a position to advise their patients intelligently in accordance with the latest scientific opinion. The public is becoming eager for enlightenment on the subject of proper food. I believe that the next decade will see a deeper understanding by the average person that proper food, proper exercise, proper recreation, as well as fresh air and sunshine in generous quantities, are the most potent agencies for the prevention of disease.

As a greater number of dental hygienists are being trained, many public and private institutions are employing them, under proper supervision, not only to clean the teeth of the children, but also to teach mouth hygiene and correct habits of diet. The near future will witness the general employment of hygienists in our schools as well as in dental offices. Certain dental schools are training their hygienists particularly for this work by equipping them with an adequate knowledge of pedagogy. I find that the prejudice that existed among some of the members of this Association, resulting from a suspicion that the dental hygienist might become a competitor instead of an adjunct to the dentist, is rapidly disappearing now that those dentists are finding their fears to be unfounded. It is now universally admitted that each hygienist employed in teaching mouth hygiene and diet in our schools is easily wielding more influence in the fight for prevention than any average group of five dentists engaged in the conventional practice of their profession. Members of our profession are seeing this and are using their influence to secure the appointment of hygienists wherever possible.

There are now forty states that have committees on mouth hygiene and public instruction, and, in thirteen states, dentists are members of or consultants to the state department of health. This should be true in each state.

Dentists in great numbers are seeing the necessity of applying some of the rules of prevention in their private lives. The value of wholesome recreation—of golf, fishing, travel, good literature, hobbies such as making collections of historical or scientific value, and any other wholesome sports or pleasures—is appreciated as never before. Theodore Roosevelt, busiest of all American executives, though hard pressed for time, and more harassed and hurried than any member of the dental profession, was able to stand up under the strain because he could find enjoyment and mental rest in a good book or in such pastimes, I was surprised to learn recently, as making a mental collection of the songs of birds. The secret of his tremendous vitality and energy was his ability to relax, and to take an interest in things that would seem trivial to many of us. An increasing number of dentists are discovering the art of finding true happiness in their leisure as well as in their work. Liberal vacations are filled with sunshine and ex-

posure to the elements or with games in the great out-of-doors. The disease-resisting value of wholesome recreation, free from worry, is recognized as a fact by a growing number of the profession, because worry, that most disastrous state of mind into which we are all prone to fall, is one of the greatest destroyers of health and happiness, and therefore of efficiency. The average dentist should be able to practice his profession many years longer than he does at present, and thus add to his value and usefulness as a minister of public health. The sallow-faced, nervous, worried type of dentist, who allows his practice to run him into an early old age instead of organizing his daily program so that his professional activities yield him a life of health and true happiness, is becoming a relic of the past. The habit of taking two afternoons for recreation during the summer, to compensate in part for the vitality-consuming extra hours of work at the chair or in the laboratory or in the study that every conscientious dentist is called on to give freely, is, I am glad to say, including more and more happy addicts, particularly among our younger and middle-aged colleagues, and the effects are very noticeable to one who has had an opportunity to make special observations in widely separated parts of the country.

Prevention, therefore, is one of the things that is uppermost in the mind of the average dentist of today. I am also glad to report that the great majority of dentists have lately been taking a strong interest in dental education, particularly in its relation to research. This is one of the most encouraging signs that dentistry is "coming into its own." This unusual interest is undoubtedly inspired in part by the recent publication of the Bulletin on Dental Education, by the Carnegie Foundation, as well as the discussion that has been engendered on various plans for the promotion of dental education.

The members of the profession are anxious to discuss dental education with any one who is qualified to give them information. I have heard many commendations of the conclusions and recommendations in the Carnegie Bulletin, and have yet to hear anyone differ seriously with its arguments. As to the difference of opinion that is reflected in the various plans of dental education now in operation at the dental schools in this country and Canada, all seem to agree that these five principles must be recognized in every satisfactory effort to train the highest type of dentist in the future:

1. The student should pass through a thorough test of his ability to carry college work before being admitted to the dental school.

2. The course should meet the present day insistence of the public for a larger number of better trained dentists.

3. The course, while recognizing the close relationship that exists between medicine and dentistry, should stand four-square on the purpose to maintain dentistry as a separate organized division in the group of professions whose purpose can be described best by the term "health service" as used by Dr. Gies in the Carnegie Bulletin. Public health administration, education for the prevention of disease, nursing, dental hygiene, pharmacy, as well as medicine and dentistry, are all important divisions of health service.

4. The course should be so arranged that the standing of the dentist

as a partner of equal rank with the physician in the great group of professions that are devoted to health service shall not be questioned in the future.

5. The plan should offer emphatic encouragement to graduate study and research.

On these propositions, the vast majority of the profession seem to be united. I have my own ideas as to the plan of dental education that best meets these requirements, and I am personally gratified that, in the state where we are now being entertained, as well as in the states of Minnesota and my own native Wisconsin, and in Western Pennsylvania, the collective opinion of the members of the profession coincides exactly with my own. I am going to keep my faith with you, however, and will resist the temptation with which I am confronted at this time. I shall adhere to the plan that I announced at the outset; namely, that of reporting, without recommendations, my observations concerning the general opinion of the profession on the great problems in dentistry.

I am glad to be able to report an almost unanimous opposition to the movement started by a small minority of our profession to create a new profession, not included in or identical with either conventional medicine or dentistry; namely, stomatology, which, it is their desire, will eventually take over certain of the functions of dentistry as we now understand them. There seems to be a general agreement with Frederick C. Waite of Cleveland that: "Even if the medical profession desired to absorb the dental profession, which it does not, the dentists would not permit it, nor will it be any easier to supersede the dental profession by a new profession. The thing to do is to oppose any diminution of the efficiency of the present dental curriculum and to aid in improving it by bringing to identity with medicine the preliminary professional education."

Dentists everywhere express satisfaction over the increased financial support that has been given a few dental schools. The fact that certain schools have lately been aided by private philanthropy, while others have been more generously supplied with public funds, is encouraging to the profession. And everywhere, now that the Carnegie Foundation's Report has proclaimed dentistry as being deserving of support, the hope is being expressed that such aid will be forthcoming to all worthy schools in generous amounts. During the past five years, philanthropic persons have contributed from their private funds an average of twenty-five million dollars a year for the support of medical schools, and last year the amount was one hundred million dollars. Members of the profession hope that dentistry will soon receive its proportionate share of this support.

The members of the profession are greatly interested in research. They are, on the whole, disappointed with what has been accomplished during the last five or six years, and this disappointment is perhaps justified. The work under the supervision of the Research Commission, and the money appropriated by the Association for its furtherance, have been serving useful purposes ever since the organization of the Commission in 1913. I find, however, that it is the general consensus of opinion that a study should be made of the whole matter with a view to effect-

ing better systemization, simplification and possible centralization.

The funds of our Association appropriated for research should be carefully expended in securing as much aid outside the profession as possible. We must still admit that we have but few men who are prepared to do really scientific work, and still fewer who can devote the necessary time to such study. In consequence, while some of the studies that have been carried on have been fruitful, the collective results have not been very encouraging.

The cooperation that this Association has established with the United States Bureau of Standards for the investigation and standardization of materials used in dentistry has the approval of the profession. For obvious reasons, much caution must be exercised in the investigation of such materials, in order that it shall be maintained above the suspicion of bias. True scientific experimentation should give unquestioned, impartial results, and steps will most certainly be taken to see to it that this end is consummated. Great interest has also been aroused in the proposed plan of cooperation with the American Medical Association, under the terms of which an experienced chemist will analyze drugs and medicines that are offered to the dental profession, and also investigate the claims that manufacturers make for such preparations. Worthy products will be differentiated from those that are unworthy or fraudulent. The medical profession has long been aided by a similar service of protection from quackery. The members of our Association who desire to secure reports on any drug or medicine that is being offered to the profession, or to the public, will soon be able to secure more definite information concerning this matter by writing to the General Secretary of our Association, if my recommendations to the House of Delegates on this point meet with the approval of that body. I am proud to report the arrangements that we have concluded, pending this approval, as one of the definite, constructive accomplishments of the present administration.

Members of the profession are also taking a great interest in another development of the past year. Your officers, after considerable preliminary study and effort, have succeeded in making all the preliminary arrangements for establishing a research program with the United States Bureau of Public Health Service at Washington. Such a program should have been started many years ago. By Act of Congress in 1902 (please note that twenty-five years have elapsed since that time), a division of scientific research was established in the Bureau of Public Health Service for the purpose of "investigation of diseases of man." It is high time that the attention of those who are responsible for the conduct of this Bureau give some attention to the investigation of diseases of the teeth and oral cavity with which mankind is so generally afflicted. I am glad to be able to report that the present Surgeon General is in hearty sympathy with these statements. Accordingly, at no cost to the American Dental Association, the Bureau will undertake two elaborate detailed studies, each to cover a considerable period of years, if these plans are approved by the Director of the Budget, as well as by President Coolidge and Congress. The first of these studies will comprise an investigation into the cause, prevention and

control of the most common of all human ailments, dental caries. What are the forces that permit destruction of the teeth in one mouth and perhaps do not allow destruction in another mouth under seemingly identical conditions? The second study suggested to the Bureau by your officers will relate to the cause and prevention of pyorrhea alveolaris and its associated disturbances. This will call for an extensive study of the biochemical factors involved in bone resorption and tissue degeneration, and the character and influences of micro-organisms. The studies of these great problems, with which our profession is confronted, should accomplish much during the next ten years, if a group of competent scientists employed by the Bureau devote their whole attention to them.

Advisory committees to both the Bureau of Standards and the United States Bureau of Public Health Service will be appointed. It will be the chief functions of these committees not only to guide the progress of the work but also to instil into the research workers that may be delegated by the Government that personal interest and enthusiasm which is necessary for progress in scientific experimentation.

It seems extremely probable that a bill authorizing the organization of a dental division in the United States Bureau of Public Health will be approved at the next session of Congress. The enactment of this law will mean much to the public and to our profession. Under the terms of the new law, dental officers employed in the dental division may be detailed for investigative work in the Division of Industrial Hygiene and the Division of Child Hygiene, as well as in the Division of Scientific Research. The activities of the dentists now in the employ of the Bureau are at present so limited by law that their use by the government for purposes of research is practically prohibited. I appeal to every dentist to interest himself in this matter and to lend his personal aid to the members of our legislative committee, who have done such a fine piece of work on this matter thus far. From our point of view as members of the dental profession, the passage of this bill (H. R. 10125) will probably be the most important single event that will occur during the ensuing year, because the new law will make it possible for the Bureau of Public Health Service to interest itself, on a permanent and substantial basis, in the problems with which dentists are confronted.

It is the opinion of a large number of dentists that widespread interest in dental research will not be aroused until dental schools plan their courses so that graduate work, and hence research, will be placed upon a sound educational basis. Until this is done, little may be expected of the future, with respect to research, from the members of the dental profession, except in certain isolated or extraordinary cases. Graduate students in dentistry should be appropriately rewarded and encouraged with graduate degrees comparable in reputation and quality to the degrees awarded to graduate students in other branches of learning. Care must be taken that these degrees are not cheapened by awarding them indiscriminately or to persons not having the proper scholarly preparation and necessary preliminary undergraduate degrees. If this should occur, more harm than good would re-

sult from the efforts to establish research on a solid foundation.

I have made reference to the Bulletin issued by the Carnegie Foundation on Dental Education in the United States and Canada. Its tremendous importance to dentists has occasioned a great deal of enthusiastic discussion since its publication in June. It marks an epoch in the progress of dentistry. Many dentists with whom I have discussed the matter consider it the greatest single event in the history of our profession. The immediate results of the widespread study of this report, by the profession as well as the public have already given an intimation of its ultimate far-reaching effects. The conclusions in the Bulletin are so well worked out and so logically arrived at that they cannot be controverted. This is true because, as President Pritchett of the Foundation says in the preface, "The study has been carried out by Dr. Gies with an open mind and with the single desire to be of service to the cause of professional education. It has taken him five years to complete the work." And he adds further on, "No study of this character has ever been made in which there has been such complete cooperation on the part of the profession itself." Dentists all over the world owe William J. Gies a lasting debt of gratitude. An eminent scientist and teacher, possessed of a keen, analytical mind, Dr. Gies has given his entire time to the service of the dental profession during the past six years. Though not a dentist, he is a keen observer, a thorough scholar and the possessor of an unusual gift of analysis. Added to this, he is a master in his use of language, a fact which is reflected in the clarity and smoothness of expression to be found in the Bulletin. The great work that Dr. Gies has just completed will be esteemed more and more as time goes on, and his name will be honored wherever dentistry is known and appreciated.

The Bulletin will not only influence dentists by stimulating their interest in dental education and research and by leading them into a full appreciation of the importance of their calling, and dental schools, by causing them to analyze their shortcomings in an effort to improve them as well as to reorganize their curriculums along the lines suggested in the Bulletin, so that interest in graduate courses and research may be stimulated, but it will also have its effect on the public by increasing the respect in which the profession is held, and suggesting endowments and other financial aid for the necessary support of dental schools. Then, too, it will undoubtedly also influence the medical profession by proving the need of a more intimate cooperation with the dental profession. As an evidence of the public interest in the Bulletin, I need only remind you of the splendid public notice it was given both in the news and editorial columns by the newspapers and magazines of the country. The reaction of the profession toward this Bulletin, as far as I have been able to ascertain during the past three months, is one of gratitude to the Carnegie Foundation, admiration of Dr. Gies and unqualified approval of the subject matter.

Throughout the years that Dr. Gies was collecting the facts and information upon which the Bulletin is based, he worked in close collaboration with the Dental Educational Council of America. Inasmuch as the influence of the

Council in raising educational standards in dentistry has never been so strong as it is today, it deserves the continued support of organized dentistry. During the past year, the minimum requirements of the Council for recognized dental schools have been again revised so that educational advance may keep well ahead of progress in the profession.

One of the problems stressed in the Carnegie Bulletin has been a topic of discussion among dentists for the past half dozen years at least; namely, the closer association of dentistry and medicine, of dentists and physicians. The general opinion of all of the members of our profession, as well as of many leading physicians with whom I have discussed the matter, coincides with the conclusions of the Bulletin, which are summed up in the statements made by President Pritchett in the preface to the Bulletin: "Dentistry . . . cannot longer be ignored in the training of general practitioners of medicine. The practice of dentistry cannot now be made a specialty of the conventional practice of medicine, but should remain a health service of equal recognition with the other specialties of medicine. Both medicine and dentistry . . . are agencies of health service and can render that service only by cooperation." The Bulletin also urges the establishment of combined dental and medical courses in cooperation with suitable dispensaries and hospitals for the training particularly of maxillofacial surgeons, oral surgeons, and orthodontists, the specialties of practice that most intimately embrace the joint responsibilities of medical and dental service.

It is the unanimous hope of the members of our profession that these statements will not only arouse all of our medical schools to the necessity of recognizing the various phases of oral health service in the medical curriculum, so that a better general understanding of our problems will obtain among the members of the medical profession, but also influence our dental schools to give more attention to oral medicine, such as the detection of cancer. When dental and medical schools are conducted in closer cooperation, particularly in their clinical departments, as has been repeatedly suggested by those who have been thinking about this matter, both the dentists and the physicians will be in a better position to serve the public.

A survey, conducted in March of this year, disclosed the fact that of the seven thousand hospitals and allied institutions in the United States, only six hundred and ninety-five, or one-tenth, provide some form of dental service to their patients, and, in many cases, even this service is nominal and limited in scope. It is the opinion of many of our members that a nation-wide campaign should be started at once which should not cease until each hospital of any size or consequence in the United States is equipped to give the fullest oral health service to its patients. There are three good reasons for dental service in hospitals. The first is the advantage it offers to the patient, whose dental defects, though contributing to his condition, may not otherwise be detected. The second is the value of hospital training to a dentist or dental intern. The third is the promotion of research, for which certain types of hospitals offer ideal conditions. In certain cases, records may be kept covering a considerable duration of time, during which

the various treatments may be compared, and the patient's diet and habits may be noted, controlled and corrected.

Great interest has been manifested in our various component groups, and much favorable discussion has been aroused by the efforts of your national and state officers to increase the total membership and improve the organization in general. Through the faithful cooperation and efforts of the officers of the component societies, I am happy to report that this association had 33,554 members on October 1, an increase of 3,364 for the year. The increase has been registered only as the result of the concerted assistance of almost every member. This work must go on during the succeeding years until the Association has its maximum strength. With a large membership, we will have a proportionately larger income, so that it will be possible, for example, with larger appropriations, further to improve and enlarge our mail-service library facilities, to increase still more the excellent work that our department of dental health education is doing for the public as well as for the component groups, to enlarge and extend the work of the Relief Fund, to increase the scope and value of THE JOURNAL, and to extend aid to those parts of the country where (as recently was the case in one of our Western States) the best interests of ethical dentists may be assailed. A larger membership would strengthen our relations with the various municipal, state and federal governments, so that the needs of the people with respect to dentistry would receive the prompt and generous attention they deserve. It is indeed true that power comes from numbers well organized. The most compelling reason, however, why our organization must become more powerful is because it seems to be an established principle that dental service in any community is efficient and progressive in direct proportion to the strength of organized dentistry in that community. This truth has been exemplified many times. Where dental organizations are strong and active, there the public is well served, and dentists, as a consequence, prosper.

Not only have the members of the Association been interested in increasing their numbers this year, but they have also made great strides in improving their organization. A conference of the officers of state societies held in the Central Offices, last January, in which seventy-four representatives from twenty-four states were in attendance and at which thirty-two papers and discussions were presented, was such a success from every point of view that it will undoubtedly become an annual event. Many of the problems of component organizations were discussed, and a closer, better feeling was developed among the state groups.

Another matter concerning which I took pains to inform myself is the agitation to give dentists the right to prescribe spiritous liquors for their patients under the Volstead Act. I found that dentists, as a rule, while agreeing that they are entitled to the prescription privilege, do not want it for fear of its attendant mercenary and demoralizing consequences. I am inclined to agree with the great majority of dentists who feel that it is futile to attempt to make people temperate by force and who regret the adoption of the ill-advised Eighteenth Amendment. Thus far, the profession has escaped the degenerating influence of the Volstead law, and

the consensus of opinion of our members the country over is that it would be unwise as it would be impractical to petition Congress to amend the law. I believe, however, that, under a proper modification of the regulations, a dentist should be permitted to obtain a limited amount of alcoholic liquor for its administration to patients who might require stimulation either during or after a dental operation. Most dentists favor such a reasonable provision and we feel assured that this freedom to give patients proper treatment will be recognized by the Director of Prohibition, if suitable legislative action is taken by the House of Delegates at this meeting.

During the past few years, an increasing number of state medical associations have seen the necessity of employing full-time executive secretaries to carry on the work which formerly was done less efficiently by part-time officers. The fact that, in each case, these full-time secretaries have paid big dividends in increased service, with but little added cost to the members in their respective associations, has started a discussion among many members of the dental profession as to whether this plan would be worthy of adoption in the various state dental associations. It is argued that such a secretary could take general charge of the arrangements for meetings, including the technical exhibits; could give or procure for members such information or advice on matters relating to dentistry as they might desire; could become managing editor of the state society bulletin, and could watch the state legislature and other law-making bodies, not only to defeat legislation that is based upon fallacies or ignorance of scientific progress, but also to help the organized dental profession to encourage the adoption of all legislation concerning dental matters that would promote the public welfare. The employment of full-time executive secretaries by the larger state societies should receive the careful consideration of those groups.

To the great majority of the dentists with whom I made contact during the year, it is a matter of general disappointment that a national board of dental examiners has not yet begun to function. I do not know of any other subject on which I have been questioned more often. Just as soon as it is possible to work out a means of financing the board, we can put into effect the plans that have been the culmination of many years of thought. The present methods of certain of the state boards are certainly in need of revision and modernization. Greater uniformity in administering the various educational tests by state boards, and better ways of finding out what a candidate knows and can do, should be developed. The members of some of these boards often forget, as President Butler of Columbia University so well said in an address made last December before the New York Academy of Medicine, that, "The fact of the matter is that all you can do in a professional training school is to give your young students fundamental knowledge, habits of mind and thought and observation, a limited amount of experience, and turn them out to grow by the experience which is to be their own. If you are going to hold youths in university schools . . . until they are leaders . . . they will never be graduated." As a result of the present attitude of many examining boards, the

dental schools are obliged to cram their students with facts that will enable them to pass the examination, and this, as President Butler puts it, "accounts for our overcrowded courses of study." I am not attacking the ability or sincerity of the men on our state boards. They are all well intentioned and no doubt with but few exceptions are unprejudiced. But I do think that the stabilizing influence of a national board, and the ensuing reorganization of methods, would be a blessing to our dental schools and would encourage them to adopt the most modern pedagogic methods, so that the student's habits of thought and observation would receive more attention, and the cramming of facts and purely technical procedures would receive less. The dental students of the future should give more time to calm reflection and undisturbed study, but less to the dread of state board examinations and the pet beliefs in theory and practice of the individual examiners. A national board of dental examiners might also evolve a method by means of which those who announce themselves as specialists in particular branches of dentistry might be required to demonstrate their ability in an examination before they would be allowed to lay claim legally to such specialized ability. At present, thirty-seven states are cooperating with the National Board of Medical Examiners. There is every reason to believe, from the enthusiasm with which this idea is received everywhere, that a national board of dental examiners would win commendation by an even greater number of the states.

The general recognition of the national board of dental examiners would serve to put an end to several evil practices which, for lack of time, I cannot enlarge on here, but concerning which I have heard no end of discussion and general resentment among dentists throughout the country. I refer to the practice of erecting Chinese walls about certain states by the enactment of laws which practically exclude recent dental graduates from many other states from taking the state board examinations in these particular states. Legislative interference with dental education, and the writing into laws, as minimum requirements, the several plans of dental education that are being tried out as experiments in the various dental schools, is sure to end disastrously. The service that the people of the states guilty of this shortsighted policy have a right to expect from the dental profession is certain to suffer as a consequence. Educational institutions should be legislated for by educational bodies, and should be forced to meet the standards insisted on by such competent authorities or suffer the consequences in lost prestige, but they should not be penalized or hampered by shortsighted law makers whose passing belief in some plan of dental education, or a certain entrance requirement, or a peculiar local exaction for graduation, may prove to be wholly wrong or even ridiculous with the passing of the years.

And so I could go on giving you a further account of what our membership is doing, saying, hoping. But I must draw to a close. My address has already exceeded the legal limits so wisely prescribed by the constitution for garrulous presidents. I desire to add one thought, a very simple one, and then I am through. It is merely this: I am an optimist. I believe that we as a profession are going to attain our

goal in the public service. I believe that since we have earned it, we will soon receive the public recognition that we deserve; that our educational institutions will soon be accorded the generous support the medical schools are receiving; that great progress will be made in the near future with respect to the investigation of scientific problems relating to diseases of the teeth and adjacent tissues; that the relationship between the dentist and the physician will soon become such that they will understand each others problems and work together in greater harmony; that hospitals will provide complete dental service for their patients; that the campaign among school children for correct habits of diet and mouth cleanliness will bring even more satisfactory results than any of us now anticipate. And finally that this great organization, the American Dental Association, which I have had the pleasure and honor of serving for the greater part of my life, will soon realize its maximum possibilities for public service. To this end, we can all put forth our best efforts and, as a result, we shall experience the joy that comes with service, desiring nothing for ourselves that we do not also desire for the rest of mankind. Let us approach our duties as dentists not only with hope and enthusiasm in the future of our profession, but also with the reverence that its high importance merits. The Chief Executive of our great land, President Coolidge, in a recent public address pointed out that "all of our science and all of our arts will never be the means for true advancement of our nation, will never remove us from the sphere of the superficial and the cynical, will never give us a civilization and a culture of any worthy or lasting importance, unless we are able to see in them the outward manifestation of a spiritual reality." It is in this spirit of veneration and devotion that we will find our greatest happiness. May we all strive more earnestly, in a spirit of warmer fraternal affection and deeper, better mutual understanding, to live up to the responsibilities and make the most of the opportunities that our membership in this great association presents to every member.

APICOECTOMY*

By CHALMERS J. LYONS, D.D.Sc., Ann Arbor, Michigan

IT will be the object of this paper to again call attention to the possibility of the eradication of those morbid conditions about the apical ends of certain tooth roots caused by devitalization, by some other means than the extraction of the tooth.

It must be clear to all that when there is disease and death of the pericemental membrane in the apical area, our present therapeutic measures are insufficient to put that region of the mouth in the best possible condition for the future welfare of the patient.[1]

For the purpose of discussion, the foregoing statement will be assumed to be true, and if it is true, in the treatment of this class of cases, surgical procedure must be the one of choice. The surgical procedure may be accomplished in one of two ways: (1) by extraction of the tooth; (2) by opening through the mucoperiosteum and external alveolar plate in the immediate vicinity of the diseased root end and mechanically removing the diseased portion of the root with its pathologic involvment. It is the latter procedure which will be here discussed.

We approach this subject with the full realization that many conscientious operators have an honest doubt as to its practicability. After ten years of careful experimental work and close observation of the cases in which we have operated, we believe, under certain limitations, to which your attention will be called, that this operation is sound.

Those of you who, after reading the voluminous literature on the pulpless tooth question during the last decade, coupled with your own clinical experience and observations, are still of the opinion that every pulpless tooth becomes a menace to health and cannot be made safe for the individual, we shall not try to convince.

To those of you who believe that certain pulpless teeth can be sterilized, we submit this operation as sane for some of those morbid conditions for which therapeutic treatment *per se* will not suffice.

Several years ago in the study of this subject, at the University of Michigan, U. G. Rickert and I established four fundamental principles for this operation.[2] 1. Diagnosis of the case. 2. Sterilization and filling of the root canals. 3. Resection of the diseased portion of the root and curettage of the diseased area. 4. Sealing the end of the root with its exposed tubuli with a substance which would effectually pro-

*Read before the Section on Exodontia, Anesthesia and Roentgenology, at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

1. Lyons, C. J.: Surgical Technic of Apicoectomy, J.A.D.A., 7: 700 (Aug.) 1920.

2. Lyons, C. J., and Rickert, U. G.: Surgical Consideration of Pulpless Teeth, Internat. J. Orthodon. 9: 288 (April) 1923.

tect the root end and would not retard the process of repair.

In the whole consideration of the pulpless tooth problem, the question of diagnosis is the most important one, and the one usually given the least attention. All too frequently, the dentist sees just the tooth instead of the patient.

In the study of the indications and contraindications for the operation, the following factors must be considered: (1) the present state of health of the patient; (2) past illnesses; (3) the possible recuperative or reserve force of the patient; (4) roentgen-ray evidence, and (5) the accessibility of the tooth involved.

One of the causes of failure in this operation has been that, in the endeavor to save a beautiful restoration by root resection, the vitality of the patient has not been considered. Past illness may have so lowered the resistance of an individual that the normal process of repair will at least be retarded, if not so interfered with that failure will be the result.

From the factors which help to make up our diagnosis, we should learn something relative to the possible recuperative forces of the patient. Here, the age of the patient must be considered. With any wound or operation in the aged, the process of repair is slow, and the prognosis in the repair of bone is not so favorable as in the young.

This operation is contraindicated in patients of advanced years. It would be questionable whether the cavity resulting from the operation would be filled in with normal tissue. In making an analysis of the possible reserve force of the patient, the condition of the blood is an important factor. Any of the wasting diseases, such as anemia, tuberculosis and diabetes, lead to a state of constitutional dyscrasia which will have a profound influence in preventing repair after this operation.

Without a certain definite blood supply surrounding the field of operation; normal repair will not take place. Notwithstanding the fact that the tissues surrounding the teeth have a very rich blood supply, in certain types of individuals, under certain pathologic conditions, it will not be sufficient to produce normal repair. Before determining whether root resection is indicated, let me repeat: let us study the individual, not just the tooth.

The fourth factor to be considered in making a diagnosis is that of roentgen-ray evidence. After all the discussions to the contrary, many dentists, in making a dental diagnosis, are pinning their whole faith to the roentgen-ray film. Frequently, the roentgenogram is misleading. Keep in mind that, in the roentgenogram, we are looking at shadows and not at the pathologic area, and the film should be used only in checking up the history and clinical findings in the case.

The fifth factor that we have mentioned in making our decision as to the indication or contraindication for this operation is the accessibility of the tooth involved. We can all agree that the anterior teeth are of greater value to the average individual, especially from the esthetic point of view, than are those in the posterior portion of the mouth, and a greater effort should be made to save them. The fact that these teeth are more accessible gives the dentist a better opportunity for sterilization and filling of the root canals. Because of the accessibility of these teeth, a clean surgical operation may be made.

For the foregoing reasons, we believe that these operations should be limited to the single rooted teeth, and performed then only when the involvement does not extend beyond the apical third of the root of the tooth.

The operation should never be made simply with the idea in mind that a beautiful crown or bridge abutment showing pathologic involvement at the end of the root may be saved by the procedure itself. If the root end is infected, the probabilities are that the whole root canal and tubuli are involved. All the infection, not only at the root end but also in the canals and tubuli, must be eliminated before normal repair can be expected.

This brings us to the second principle underlying this operation, that of sterilizing and filling of the root canals. It will not be germane to this paper to enter into a discussion of the methods and procedures of sterilization and filling of root canals. Suffice it to say that this operation should always immediately precede the operation of apicoectomy. The important point is to know that the root canal is sterile and thoroughly filled. Any of the well known and accepted methods for the procedure may be employed.

Our next principle and the next step in an apicoectomy is the resection of the diseased portion of the root and curettage of the diseased area. The technic of this operation has been so thoroughly and fully described and illustrated in textbooks[3] and papers[1] that we do not deem it necessary to go into details of the technical procedure here. However, a brief review may not be out of place.

Under conduction or infiltration anesthesia, a mucoperiosteal flap is laid back immediately over the end of the root to be resected, exposing the external alveolar plate. By the use of sharp chisels under hand pressure, a sufficient area of the alveolar plate is removed so that the infected crypt and the apex of the tooth root are exposed. The resection of the root end is made at the floor of the crypt and the root of the tooth is cut down to healthy tissue. We have found the Henahan surgical drill No. 4 a very convenient instrument in cutting off the root end. The resected end is now lifted out of the crypt and the pocket thoroughly curetted with spoon-shaped bone curettes. A large round bur is next used to smooth off the sharp edges of the alveolar plate and to cut the end of the root and the base of the crypt down to healthy tissue. The cavity and root end are then polished with a gold finishing bur.

We are now ready to carry into effect the fourth fundamental principle of the operation, i. e., sealing up the end of the root. For the past ten years, we have been reducing silver over the exposed root ends, and it seems to have met all of the requirements of completely sealing up the end of the root and does not interfere with the process of repair. This procedure is accomplished by dissolving a few crystals of nitrate of silver in ammonium hydroxid until the fumes of ammonia have disappeared. This gives a slightly cloudy amber liquid. The silver nitrate is reduced to ammoniacal silver oxid. A small pledget of cotton is used to carry the solution to the restricted end of the root, which has been previously dried. The silver oxid is then precipitated by means of a warm burnisher

3. Thoma, K. H.: Oral Abscesses, Boston, Ritter and Company, 1916.

4. Ely, L. W.: Bone Formation and Bone Pathology, California State J. Med. 18: 21 (Jan.) 1920.

or by eugenol. After two or three applications of the ammoniacal silver oxid, followed each time by precipitation, the end of the root becomes perfectly black from penetration of the silver.

The walls of the crypt are now agitated until the crypt is filled with blood, and the mucoperiosteal flap is returned to normal position and sutured.

POSTOPERATIVE OBSERVATIONS

Just what takes place in the repair of the wound after this operation is what interests us most. It has been our observation that the repair of bone after this operation does not differ from bone repair in any other part of the membranous bones. Neither does the repaired bone differ materially from the normal bone surrounding it. In the roentgenogram, we see the regular trabeculae and marrow spaces, which would indicate a blood supply similar at least to normal bone. In opening into these areas periodically from six months to several years after the operation, we find that the formation of new bone seems to be clinically identical with that adjacent to the old wound. From our bacteriologic findings, this new bone has remained sterile. We believe that if the principles above referred to are carried out, an operation may be performed that will favor normal repair.

There are three requirements for bone repair all of which occur in these wounds: (1) blood supply; (2) building material; (3) stimulus, physiologic or pathologic.

The rich blood supply in the maxillae and mandible amply provides for the first requirement in the regeneration of new bone.

Immediately after the operation, the cavity resulting therefrom becomes filled with a healthy blood clot, which becomes the building material or scaffolding through which the new bone forms.

The third requirement, that of a stimulus, is provided for by the trauma of the operation itself. The final result should be the regeneration of new bone similar to that adjacent to the area of repair, the eradication of the infected area and the saving of the tooth for many years of usefulness.

THE NECESSITY OF GNATHOSTATIC DIAGNOSES IN ORTHODONTIC PRACTICE*

By DR. PAUL W. SIMON, Berlin, Germany

IT is not my intention to describe the technical details of gnathostatic impressions and models, or of photostatic photos. I refer you to the numerous lectures and demonstrations I presented in this country in the spring of 1924, as a guest of the American Society of Orthodontists. The paper presented in Kansas City, Mo., has been published;[1] and since the society has decided to publish an English translation of two of my books, anyone interested in this subject may gain the necessary technical information therefrom.

For those who may wish a plastic presentation, I shall give a practical demonstration, so that the instruments employed can be inspected.

The aim of this paper is to emphasize the principles upon which the new methods are based; to show some of the progress which they have engendered; to discuss ultimate objections, and, finally, to disprove the latter.

Nevertheless, it may be useful to state briefly a few elementary rules of the gnathostatic system.

We no longer consider the denture as an isolated body, but as an anatomic and physiologic part of the head, and we therefore study its exact connection with the skull, by measuring the proportions of the denture in its relation to three planes of the head. These three planes stand at right angles to each other and are as follows: 1. The Frankfort horizontal plane, which passes through the eye points and the ear points. 2. The orbital plane, which interesects the eye points and stands perpendicular to the ear-eye plane. 3. The raphé-median plane, which intersects two occipital points of the raphé-palati, perpendicular to the ear-eye plane.

These planes are not natural anatomic planes (which we have not at all on the irregularly formed skull), but artificial ones, which can be represented by straight sections. Details as to why just these planes have been chosen as especially useful and how they can be marked on the head cannot be given here for lack of time. I refer you to my other papers.

We study the dentofacial relations by making two reproductions, one of the denture, i.e., the teeth, alveolar process and palate, and one of the facial part of the head. Both reproductions, of course, must be marked according to the three planes.

We get the first by the gnathostatic model (Fig. 1). The upper model base is identical with the ear-eye plane,

*Read before the Section on Orthodontia at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 24, 1926.

1. Simon, P. W.: Internat. J. Orthodon.

the orbital plane is represented by the perpendicular line, drawn around the model, and the raphé-median plane is also represented by such an outline. (Fig. 2.)

Figure 3 shows the gnathostat fastened on the head of the patient in order to take the impression. The other necessary instruments, and their use, are illustrated as follows: at first, the orbital marker (Fig. 4), to project the orbital

Fig. 1.—Gnathostatic model.

plane on the palate of the impression; further on, the symmetrograph (Fig. 5) to draw at right angles the orbital and raphé-median planes, together with the sliding compass (Fig. 6), to measure the symmetry or asymmetry of the dental arch, and, finally, the diameter (Figs. 7 and 8) to represent the upper and lower occlusal lines and transverse and sagittal sections of the palate in the form of curve diagrams.

Figures 9-11 shows such curves of several cases, projected one into the other so that one can make comparisons.

We see, further, the cast of the upper impression with the help of a plate, which is used instead of the pointer-bow (Fig. 12), and, on the lower impression, a base is made parallel to the upper base, and at a distance of 8 cm. from it. We use a little table with three legs of corresponding height for this (Figs. 13 and 14).

The second reproduction is the photostatic photograph of the patient

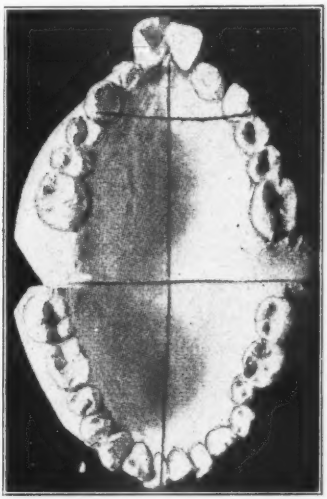

Fig. 2.—Model showing planes.

(Fig. 15) taken exactly one quarter life-size, and in such a way that the photo plane corresponds to the sagittal median plane. The two other planes are represented as sections by connecting lines through the ear-points and eye-points, and by a perpendicular to the eye-point. Further, the corpus and the ramus ascendens of the mandible are represented by lines joining the point on the chin (gnathion) to the point on the jaw angle (gonion), and to the earpoint (tragion), so that one can measure the distances (Fig. 16).

The next pictures show the photostatic apparatus (Figs. 17 and 18).

For the diagnostic analysis of each case, we therefore use the gnathostatic model, with the curve diagrams, and the photostatic photo. To explain how the diagnosis is made with the help of this material, I must refer to the normal denture, or the dental norm.

If we compare a number of gnathostatic models and photostatic photographs with each other, which, in a scientific sense, is only possible on a basis of exact localization, we find (measuring from each plane) a large number of variations. No two cases ever resemble each other in their entirety, not even those of brothers and sisters, nor even those of identical or true twins, though with these nearest possible relatives resemblances are often very marked. I can best demonstrate this fact of individual variation by presenting examples.

Fig. 3.—Gnathostat in position.

For instance, let us consider sixteen dentures which present anatomically faultness conditions: all the teeth are present and in correct occlusion. In a superficial view, these dentures resemble each other very much; a layman could scarcely detect any differences. And if we should make the customary dental casts of them, the differences would be even less easily discernible. But all this is changed the moment we begin to measure the gnathostatic models, because exact measurements are possible. Nevertheless, one simple measurement is possible even on the customary models, that of the width of the dental arches, which is very important in orthodontic therapy. Let us measure the transverse distances between the first molars, and between the first bicuspids in the sixteen cases. I have arranged these in two curves, as shown in Figure 19. The upper curve shows the distances between

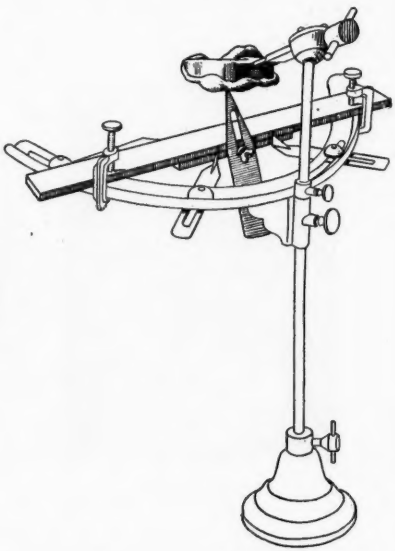

Fig. 4.—Orbital marker.

the molars, arranged according to size or distance, from 45.5 to 53 mm. The lower curve gives the distances between the bicuspids not arranged according to size, but in such a manner that each measurement is placed under the measurement of the molars to which it belongs; that is, of the same case. By this very irregular curve, we note that one cannot speak of regularity, or great resemblance of the arches, even in these so-called "normal" dentures.

The extraordinarily important consequences emanating from this statement, especially for orthodontic practice, can be demonstrated with the same simple example of arch breadth. In most anomalous cases, we find arches that are too narrow. They must be widened, *but how much?* A glimpse at the curves just shown indicates that nature, even with its quite faultless dentures (which many mistakenly call "normal" dentures), does not answer

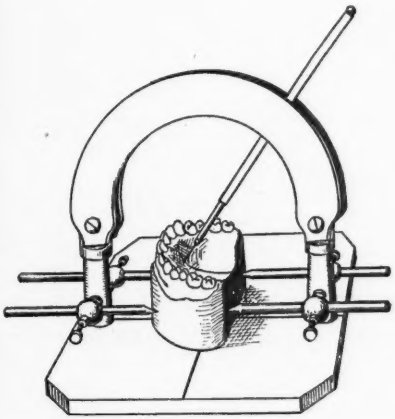

Fig. 5.—Symmetrograph.

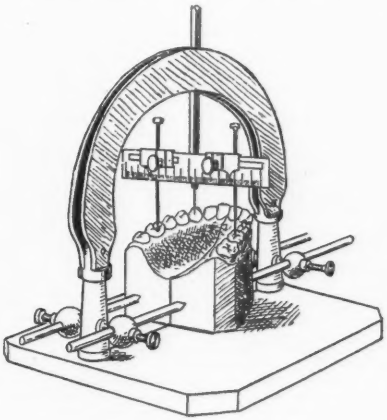

Fig. 6.—Sliding compass.

Now, as to the other symptoms of the denture, it goes without saying that we find practically the same variations. Therefore, we must face the fact that, even among the best and anatomically most perfect dentures of a number of individuals, there are extensive differences in form. It is not admissible to call an anatomically correct denture a "normal" denture, simply because a particular denture shows this formation, another one a variation, and that therefore, it would be unsafe to attempt to determine a norm.

our question differently: Do as you like, just as I do. Indeed many practitioners seem to acknowledge only this one solution of the diagnostic problem, i.e., an arbitrary attitude. But a distinction must be made between the apparent arbitrariness of Nature, whose efficiency our finite minds are not able to penetrate, and the arbitrariness of the practitioner, who does not fully understand but who wishes to impel Nature.

By the gnathostatic system, we attempt to find out, through extensive and exact measurements, whether these

differences in nature (just shown in one single example) are without plan or system, or, whether, in some way, a systematic purpose, a natural law, can be discovered.

This problem is attacked in a strictly scientific manner, avoiding all subjective opinions and dogmas. Our procedure is as follows.

We are collecting as many individual cases as possible in one population-

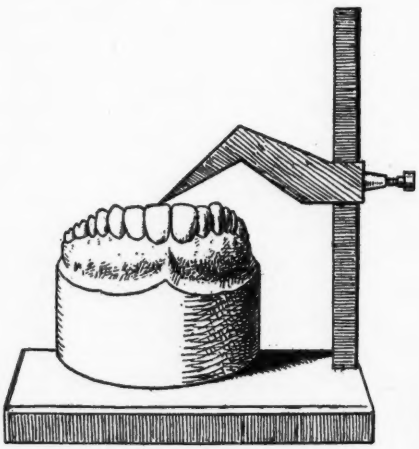

Fig. 7.—Diameter.

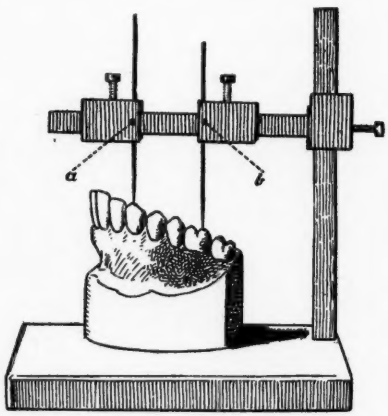

Fig. 8.—Diameter.

center, in persons who have grown up in a similar environment. They must have faultless dentures, with anatomically correct occlusion. Their gnathostatic models and photostatic photographs are compared in such a manner that the characteristics which are most important for our judgment in practice are ascertained and measured from the three planes, that is, in three dimensions. We thus find a great many variations, corresponding to our former example of arch breadth. The orbital plane, for example, may pass through the cusps of the upper first bicuspids, or through the mesial inclined planes of these cusps; through the cusps of the cuspids, or through the mesial, or distal, inclined planes of their cusps; or through the incisors, etc. The tables presenting the results of these measurements show that this characteristic also varies considerably. But we find few in which the orbital plane passes through the incisors, and few in which it intersects the bicuspids. The number in which the orbital plane lies within the cuspids is much greater. In the greatest number, it passes almost exactly through the cusps of the cuspids. It, therefore, seems that we have no arbitrary and irregular arrangement but a systematic one, which is particularly impressive if one arranges the results in a graphic curve (Fig. 20). You will note the three teeth that must be considered: the lateral incisor, the cuspid and the first bicuspid. The vertical lines indicate the various possible intersecting lines of the orbital plane in

these three teeth, and the horizontal lines, the distribution according to percentages of the 137 individuals examined by Herzog. You will note that, in 45 per cent of all these cases, the orbital plane passes exactly through the cusps of the cuspids; in 32.4 per cent, it passes between the cusp and the proximal surfaces, 15 per cent mesially and 17.4 per cent distally, and in 5 per cent through the bicuspid, in none through the incisor. Considering the results as a whole, in about one-half the cases, the orbital plane passes exactly through the cusps of the cuspids, and, in one-third, it passes nearby.

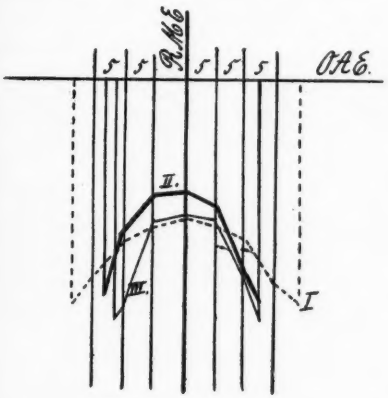

Fig. 9.—Case curve.

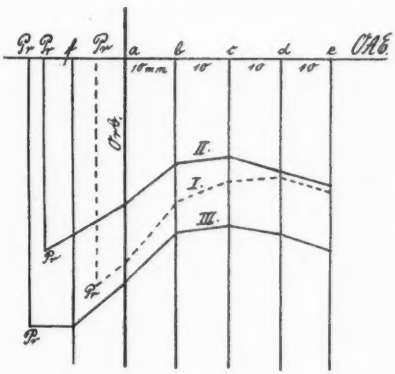

Fig. 10.—Case Curve.

In biometrics, there is a law known as the law of Quetelet, by which somatic characteristics (for example, the stature of the body, the girth of the chest and the weight of the brain) of individuals are compared and are found to be markedly variable. Nevertheless, their distribution is rather systematic, and this we designate as the "binomial distribution of the variants." A great many individuals were included in Quetelet's examinations for an average of the examined symptoms, and the more the measure of the examined symptoms deviates from the average to either side (the plus and the minus side), that is, the more extreme the variants are, the smaller is the number of their frequency.

It cannot be doubted that this average which must be reckoned for every characteristic (including features of the denture) with the aid of exact methods of measurement, represents what we have always designated by the word "type;" and this type is identical with the norm. The law of Quetelet makes it evident that Nature, in spite of these multiple variations, aims to produce in each population group again and again a certain conformity, to maintain a normal, or average, type. We can comprehend the origin of this normal type quite well, though not all of the complicated paths of nature have been thoroughly examined, and possibly never will be entirely. In all probability, the normal type is a result of inheritance for thousands of genera-

tions, on a basis of adaptation to the conditions of life. We cannot enter into full particulars here, but a great many facts gleaned from the sciences that deal with inheritance and the constitutional conditions support our opinion in this regard.

Specialists often use the word "normal" when speaking of the size of the body, or of the weight, etc. They, of course, have a certain idea concerning it, and it may be that each one of us has certain opinions regarding the normal in our race, our population, and also our family. It is natural for us to have these opinions. They exist in the subconscious mind; but they are hazy and subjective; they are like a fog without definite contours, and their definition evades you. Biometric progress, based upon a statistical study of variation, *consists of an exact formulation of the normal type upon a scientific, objective basis.*

Now, I have given a short sketch of the task of the gnathostatic system—which it has partly solved. We must calculate the normal denture type of a population center from the averages of its variation curves of the most important characteristics and qualities, on the basis of the three-plane system and with the aid of measuring instruments. If this "normal" denture has been actually determined (and I wish to state that this has been done as regards its more important characteristics), a practical diagnosis of its anomalies can be made. In my books, I have described rather extensively how this new gnathostatic procedure is followed, with the aid of gnathostatic models and photostatic photographs and with the help of a logical classification of dental anomalies; hence, I need not enter into minute details.

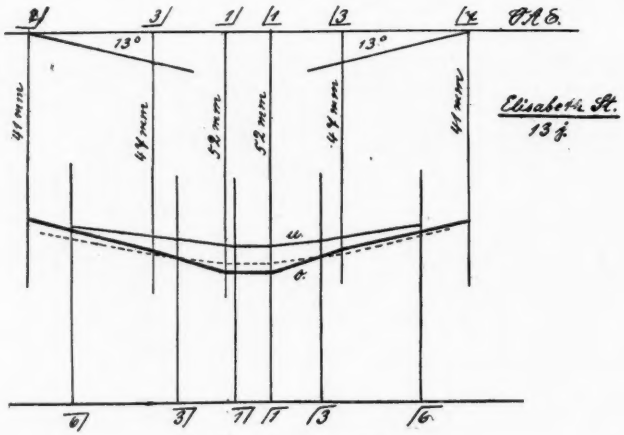

Fig. 11.—Case curve.

I wish here to speak of the objections that have been raised against the system, and I shall try to disprove them.

It may perhaps be said by some that the making of the models, curves and photographs requires much time and

effort. This is not the case, as everyone who has become intimately acquainted with their use will testify. But even if it were true, every conscientious practitioner will wish to use them when he is convinced of their value and necessity.

Now, these procedures do not inconvenience the patient, or, in any case, the inconvenience is less than that experienced in a roentgen-ray examination. Nor is the subsequent diagnosis difficult. To the contrary, the new

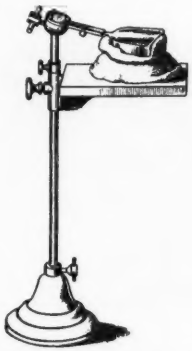

Fig. 12.—Pointer bow.

procedure is clearer, more comprehensible and more extensive than the old method. We orthodontists, who have always moved malposed teeth in the three directions of space, quickly comprehend that it is useful and necessary to make our diagnoses in three dimensions.

Sometimes the criticism is made against the cephalometric method that the measure-points on the head can be determined only inexactly. This is partly true. If one has practiced one definite technic in marking these points, the unavoidable inaccuracy is so small that it has no significance as regards the correctness of the diagnosis. But our critics who make this charge should not be so inconsistent, because they, at the same time, lay great stress on the "constancy" and "fixity" of position of the first permanent molars. It has been definitely proved that they are very inconstant, that they are not fixed, and so one must not say that they are in correct position; they are in an organ which perhaps goes through the most complicated development of all organs of the body, and which is exposed to many external influences.

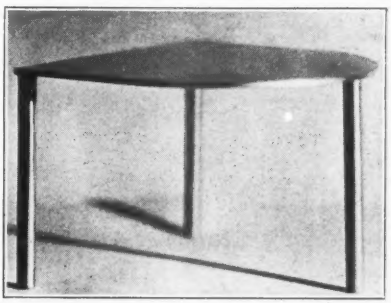

Fig. 13.—Table used in casting impression.

Another objection refers to the above mentioned normal denture, which is ascertained biometrically. It is said that its form is adequate as to morphologic relations, but that it does not take "normal function" into consideration. It is claimed that, in a forward movement of the mandible, such a denture would show apertures in the buccal teeth, resulting in an imperfect comminution of food. I have observed that these objections emanate largely from prosthodontists, not orthodontists; from men who are primarily interested in articulation, and who forget that their problem does not concern itself with natural dentures, which are com-

posed of fixed teeth, but with artificial dentures, in which other conditions prevail. We need only examine an anatomically faultless denture (of an individual, of course, who belongs to a civilized nation, not of an Australian negro or Papuan), and we will practically always observe these apertures. A study of the physiologic process of biting and chewing in natural dentures and of the food of a civilized nation will disclose that the form of our biometric "normal" denture is also very useful and represents the optimum, and that every other form would be perhaps less effective.

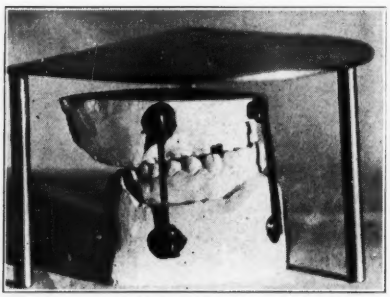

Fig. 14.—Table used in casting impression.

CONCLUSION

I wish to mention one more criticism of gnathostatics as a method of measuring, but which in reality is only an objection to the biometric norm, or against the necessity for a norm at all. These opponents demand an "individual therapy" instead of the "schematic therapy" that the norm suggests. Recalling that one cannot have any plausible objections to gnathostatic models, etc., I would remind those who pretend to be able to measure a denture without cephalometric measurements that they must prove, first, that they are endowed with supernatural ability. Personally, I believe they have not sufficiently recognized the difference between "subjective" and "objective" confirmation.

The demand for an individual therapy is not only an attack on gnathostatics, but assails all our therapy up to the present day. Let me first explain what is meant by "individual therapy," notwithstanding such explanation is difficult. Apparently, one must re-form the abnormal denture of a patient in such a manner that it will correspond with the particular individual nature. One is expected to believe that, for each individual, there is only one fitting, appropriate, "individual normal denture," differing from all others, but that it merely has not developed, because certain disturbances, or "etiologic factors" exercised pernicious influences. Therefore, it is necessary, first of all, to recognize these factors and to remove them. In this sense, an "individual therapy" is connected with the "causal," or "etiologic." And here I must call your attention to a fundamental error: the identification of anomaly with disease. A person who

Fig. 15.—Photostatic photograph.

has no other infirmity than an abnormal denture is enviably healthy, and his denture (teeth, gums, jaws, muscles, etc.) is by no means diseased. With a sick patient, to find the cause of his suffering and to remove it is indispensable; otherwise, he will not get well. With a dental anomaly, it is useful to search for causes only for theoretical reasons; it is absolutely useless for treatment purposes; or, are there perhaps special appliances for rachitic anomalies, and others for inherited anomalies, and

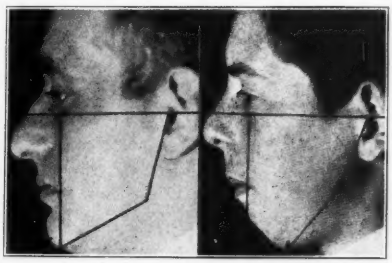

Fig. 16.—Lines drawn to represent planes.

still others for those anomalies which are due to finger sucking, etc.?

A causal therapy can exist only if we do not remove the anomaly by artificial, mechanical appliances, i.e., by a soft force, but nevertheless by force, but operate through internal and organic means, e.g., with an abnormal system of glands, and thus obtain an internal spontaneous transformation of the jaws. This seems utopian to me, at least for cases of anomalies that are marked and established. It is, of course, quite another matter in prophylaxis, or the prevention of anomalies.

And now that we have established that "casual therapy" is an error, what remains of "individual therapy"? The gnathostatic system suggests that we transform an abnormal denture in such a way that will correspond as nearly as possible to the biometric norm. The following train of thought suggests itself: Since we cannot possibly know what form a patient's denture would have assumed during an undisturbed development, we provide him with one that is most suitable in every relation, as if this denture had developed all by itself in an undisturbed manner.

A certain pattern is thus at hand, as the real individual is thus neglected in favor of the general. And what is the

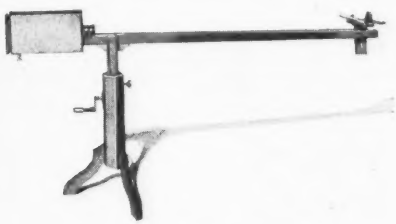

Fig. 17.—Photostatic apparatus.

condition of the individual? If you reflect on the genesis of a denture, from its very beginning—which means from the germ-cell—and if you take into consideration all of the infinitely complex influences and conditions of inheritance, of intrauterine and extrauterine existence, you will come to the following conclusion: The particular denture found in an individual prior to orthodontic treatment, regardless of its paricular kind of deformity, is the individual denture; it represents the last effect of endogenous and exogenous influences to which this person has reacted individually; and every orthodontic alteration means, under all circumstances and even if desirable and corrective, an arbitrary reshaping of the

individual form. This is only justifiable if it is patterned after a higher, better model than the individual. And this model is the biometric norm.

There can be no individual therapy. It is unknown, even in general therapeusis in disease. In every pharmocology, you will find a great many remedies that are recommended quite schematically for abstract diseases, without any knowledge of the condition in the individual. But there is an individualizing therapy that depends on certain changes in the general therapy by taking certain peculiarities of the patient into consideration.

It goes without saying that this is also true in gnathostatics. I need merely mention the age of the patient. A total maxillary protraction, for example, can be treated without extraction up to the tenth year by moving the buccal teeth distally. Later in life, one must eventually extract the first bicuspids; or, if one does not want to resort to that method for "individual" reasons, then the protraction must remain, or be left untreated. Every experienced practitioner knows how to individualize, but he must first acquaint himself fully with the general, i.e., the superindividual, method.

Recently, an author tried to define individuality on the basis of inheritance. Every child is said to reflect in his bodily structure the form of his parents, but only these, not that of other ancestors. The occurrence of an anomaly is then explained by assuming that the structure of the parents did not exactly correspond each to the other. The possibility is granted that exogenous conditions may cause anomalies, but their influence is minimized. This doctrine is a mixture of subjective opinions. The author tries to found it on scientific material; and its preparation and utilization is very imperfect. Nevertheless, an "individual therapy" is abstracted from it, the ideal demand of which is as follows: The parts of the jaws of a child that resemble the corresponding part in the jaws of one of its parents must not be changed during treatment, since they form a quite original component of the individual, and are therefore "individual normal." This demand would only be justified if the parents were always of ideal form, which, unluckily, is not the case. The inventor of this doctrine unfortunately forgets that the dentures of the parents have for decades been exposed to the form-changing influences of function,

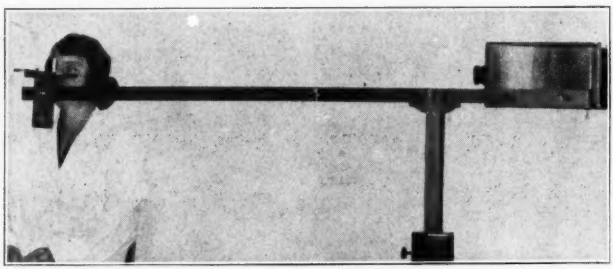

Fig. 18.—Photostatic apparatus in use.

life, etc.; that they do not in the least show the real, inherited form—the genotype.

For lack of time, I shall not refer to other objections. In any case, this attempt at an etiologic foundation for diagnosis and therapy possessed one good, in that it clearly shows the utter impossibility of such a doctrine.

Again, I believe it necessary for every orthodontist to use cephalometric,

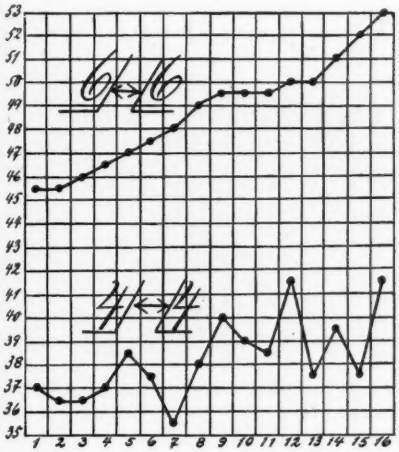

Fig. 19.—Measure of transverse distances between first molars and bicuspids.

gnathostatic methods in his practice; for, with the help of these methods, it is not only possible to judge the denture in three dimensions, which is the only right way, but the dentofacial relations are also considered in an exact manner. The personal, subjective conception is now replaced by the striving for objectivity. Orthodontics thus emerge from a state of unworked empiricism, of personal experiences and preferences, into a truly scientific vocation.

I regard these methods as indispensable for etiologic and other similar investigations, because, in this domain, an especially objective clarity and exactitude are demanded.

The determination of a dental norm on a biometric foundation seems indispensable to me and corresponds with the methods employed for many years in medicine. Only such a norm is free of hypotheses based on probability; for it does not depend on future suppositions but irrefutable figures. Only in this wise is it possible to define anomalies, their degree and their localization.

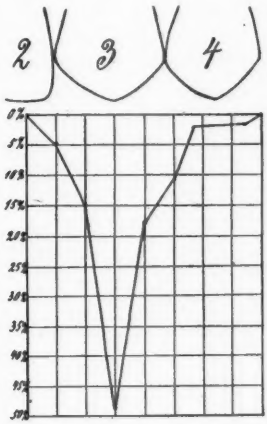

Fig. 20.—Graphic curve showing systematic arrangement of planes.

Gnathostatic diagnosis is not a gnathostatic therapy. Every practitioner is left free to determine the method and aim of treatment, and to draw on his own experiences. Gnathostatics merely tries to grasp in a scientific manner that which it is possible to grasp scientifically. Beyond it, there lies a wide field for medical intuition and orthodontic art. But the use of the bio-

metric dental norm, determined gnathostatically, is our safest and most indispensable plan, an indispensable model for our treatments. We may modify and individualize, if we have good reasons for so doing; but, in most cases, this will be unnecessary.

Above all, I regard these methods as useful for putting orthodontics on a broader basis. Our studies in anthropology, biometrics and heredity, and consideration of the human structure and other important matters no longer remain a beautiful wish, about which only a few are concerned, but a necessity of everyday practice for the extension of our knowledge. Now we have the means and they are not difficult to apply.

I thus express the hope that many new aspirants will join with old friends to advance orthodontic proficiency, in order to attract devoted students of science, and that our specialty may progress steadfastly.

DISCUSSION

Allen Holman Suggett, San Francisco, Calif.: After listening to a paper on a subject on which the author has put in ten years of scientific research, it is presumption on my part to trespass on your time. You who have read Dr. Simon's "Fundamental Principles of Systematic Diagnosis of Dentofacial Anomalies" and the Nonn Concept of Orthodontics," explaining his philosophy of the norm, fully realize the scientific, literary and philosophic background he possessed in order to carry on such a piece of research successfully. This work is founded on anthropology and anthropometry, both of which must be discredited in order to disprove him. We have done too much guessing, and we have, in the past, laid great stress on the constancy of the maxillary molars, a fiction with about as much scientific foundation as the theory that the earth is flat. It was first advanced as an hypothesis, but no attempt was ever made to prove it. Simon's research plainly shows that none of the teeth are constant in their position: variations are endless. So this theory of the constancy of the molars or, for that matter, of any of the teeth is not an hypothesis but fiction, and must be used as such, simply as an aid to reasoning. A writer may and does use the form of fiction, in order to present truths that he could present in no other way, treating the subject as if it were true. The fiction of the constancy of the molars is useful, but we must not forget that it is a fiction. Dr. Simon's work treats of the subject of diagnosis and not of treatment. Bear in mind that diagnosis is not treatment. Dr. Simon has presented to us a simple, practical method of taking impressions and making models that show the relation of the teeth to the head. We can readily

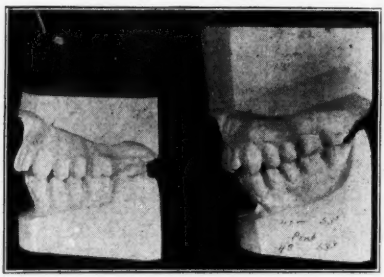

Fig. 21.—Left, an ordinary model and, right, a gnathostatic model of the same case.

see the importance of locating these planes from which he takes his measurements, outside the area effected by malocclusion. They are stable and admirably located and each one bisects both arches. If you were out in the ocean in a storm, you would hardly select a light on another boat that was lost, too, by which to guide your course, but would select the north star or the magnetic pole, because they are outside the influence of the storm. They are fixed. It is true that they have certain variations just as the planes of the growing head vary, but we understand what that variation is and plan accordingly. I have been demonstrating Dr. Simon's method of gnathostatic and photostatic diagnosis for two years and it is interesting to hear some of the objections offered. "You can't measure the head;" "you can't measure the soft tissues;" "you can't measure Nature;" etc. Why can't we do all these things? Don't we measure the

stars and weigh them? Don't we weigh and measure people? Did not anthropometrists measure every bone of the body, years and years ago? We measure the strength of the different muscles, the focal distance, brain capacity and mentality. Every dentist is doing a thousand things far more difficult than taking an impression and making a gnathostatic model. The first step in treating a disease is to discover what kind of a disease it is. They used to say, "Feed a fever and starve a cold." If that were sound treatment, it was very important to first find out whether it was a fever or a cold. People in all ages have recognized the importance of diagnosis; otherwise, they would not have resorted to

Fig. 22.—Case of extreme retraction, the occlusal plane sloping downward 20 degrees.

such drastic methods to make one. In the middle ages and later, they almost resorted to cruelty in diagnosing Christianity or witchcraft. They used to "diagnose" a witch by ducking her in a pond. If she drowned that was scientific proof of guilt. If she did not drown, that was evidence that she possessed a devil and she was taken out and burned. The diagnosis was generally made after the treatment instead of before, which was rather hard on the patient, but very comforting to the doctor. When we examine a case of malocclusion, we go through the mental process of making a diagnosis. The diagnosis may not be thorough or scientific, but it is a diagnosis never the less. We notice, perhaps very casually, what is there presented. Instead of making the diagnosis scientifically by finding and recording in an orderly manner just what is there, it is often done in a very haphazard way. We notice that there is a distoclusion and proceed to place an appliance for a Baker anchorage. After a few months, we notice that there is a bicuspid lacking, and we change the appliance to make room for the biscuspid. After a few more months, we notice that there is a very deep bite and we provide for that. By and by, we get worried because of the nonappearance of the bicuspid, and we take a radiogram and are much chagrined to find that there is none, so we proceed to close up the space we have made. By this time, we have the teeth in pretty fair condition, but the parents complain that the child is "all teeth," and that we have spoiled his beautiful mouth.

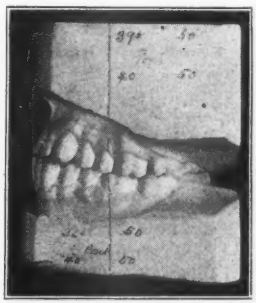

Fig. 23.—Case of extreme protraction, the occlusal plane sloping up 3 degrees.

By this time, by trial and error, hit and miss, do and undo, we have made a diagnosis, a failure. We know not what we have done nor how we did it. We have all done it, so I speak as one having authority and not as the scribes. Dr. Simon has cleverly pointed out how to make a scientific diagnosis and how to record it in orderly fashion. The gnathostatic model shows every point that the ordinary model does, and furthermore shows the three planes by which we can ascertain the relation of the teeth to the head. The ordinary model shows only the relation of one jaw to the other. The gnathostatic model shows that and also the location of the raphé-median plane, the eye-ear plane, the orbital plane by which we can measure the teeth relation to the head. In Figure 21, the top of the model represents the eye-ear plane, and you will notice where the orbital plane

of Simon's passes through the denture. It also shows the inconstancy of the molars. The orbital plane passes through the prosthion, just distal of the centrals in this model, and in this one on the right it passes down just mesial to the molars. These molars are the distance of two and one-half teeth too far forward, and in the other model they are two teeth too far distal. Figure 22 shows how all these points can be measured and recorded. Figure 23 shows the photostatic picture and where the orbital plane passes. For years, we all have heard arguments that sounded wise, at least, they were positive and sure, about teeth being too far forward, too far back, too far down and too far up, whether a gothic arch was lowered or not after expansion of the arches; but they were never settled. Dr. Simon, as the result of eight or ten years of scientific research, presents to the orthodontic profession a simple method founded on anthropology and anthropometry by which all these measurements can be easily and quickly made in our every-day practice, and recorded in an orderly and systematic manner. I venture to say that no orthodontist who has once made a diagnosis with the aid of gnathostatic models and photostatic pictures will ever again be satisfied with the ordinary models. After using this method for two years, I desire to thank Dr. Simon for the great piece of research that he has carried on, resulting in the greatest contribution to scientific diagnosis that has ever been made.

C. A. Hawley, Washington, D. C.: Dr. Simon was so kind as to send me a set of his instruments immediately after his return to Germany in 1924, and I have also been kindly favored by Dr. Lischer with the advance typewritten pages of his translation of Simon's book, so that I have had the opportunity of using this method for nearly two years. For over a year it has been a routine procedure in my office. All my impressions are taken gnathostatically and all my photographs are photostatic photographs. The extra time required for impressions is not over two minutes. My model maker in the laboratory now prefers to make gnathostatic models. The photostatic photographs take no longer than any other photograph. I have always taken my own photographs, and I spend no more time than with my old methods. Five minutes is sufficient to make the exposures. The instruments and camera with its attachments are made with accuracy of detail and are complete. So I may say that this method is well adapted to the routine of a busy practice. The making of the graphs or drawings of the curves take more time, a half hour, perhaps, but it can easily be done by an assistant, and even if I had to do it myself, it would be time well spent and an economy of time in the end. The method requires care and accuracy, of course. I made many mistakes at first, but now I think my work is accurate and uniform. One of the first questions that arises in the mind when this method is considered is "Is the law of the cuspids true?" I believe it is. One of the first questions raised when Dr. Simon read his paper at Kansas City was that, while it might be true in the German people on whom these investigations were first made, would it be true for the American people, a mixed race, or the French, or any other race? I cannot see the force of this objection. We have, in all civilized races, three types of faces, the straight, the convex and the concave. In the straight type, the most admired type here in America, I have found, invariably, that the orbital line passes through or very near the point of the cuspid. In the convex type of face, it is likely to pass a little back of the point of the cusp or between the cuspid and first bicuspid. I have only had a few cases of the concave type, not enough really to form an opinion, but I think that, in this type, the orbital line may be mesial to the cusp. I am speaking of cases in which the teeth are in good occlusion. We have in this a fundamental and most valuable method for the study of types of faces, a fascinating diversion. The adoption of this method has thrown so much light on the vexed problems of diagnosis that it has been an elixir that has renewed my professional youth and brought fresh interest and enthusiasm in my work. The days are not long enough and the years remaining are too few in which to pursue this fascinating study.

AFTERTHOUGHTS CONCERNING IMPRESSIONS FOR FULL DENTURES*

By RUSSELL WILFORD TENCH, D.D.S., New York City

IN one sense, an afterthought is a reflection concerning an act that occurs too late to affect that particular act. In another sense, an afterthought concerning a procedure oft repeated may be a forethought. The use of afterthoughts concerning past efforts in denture impression technic to influence favorably our attitude toward future efforts is the object of this paper.

Afterthoughts in this field usually occur some time after the appliance made from the impression is inserted, and it is therefore rather difficult to limit the treatment to impressions alone. We are led to consider results that follow the insertion of dentures.

Whether one's afterthoughts concerning the final outcome of impression technic may be pleasant or tinged with disappointment depends, aside from manipulative skill, on the angle from which he approaches the problem of impression technic and on the ideals that he has set up for himself, as well as his conception of what constitutes the true use of an ideal.

If he approaches the subject as one of general physics and forgets the biologic or physiologic-biologic aspect of the subject, disappointment is more of a certainty than a chance.

If he approaches the subject as he should, he will take cognizance that he is preparing appliances that are to function on living tissue. He will know that Nature never intended that foreign bodies should find lodgement continuously against the tissues of the oral cavity usually covered by dentures, and that she has neither shaped the physical form of the mouth for this purpose nor planned the structure of the delicate tissues to maintain their integrity against thoughtless abuse. He will understand that to get best results, it may be necessary to alter the form of the ridges and always to proceed with thoughtfulness.

The first essential in any impression is that it should have stability when subjected to stress such as might be employed in mastication. After stability is obtained, retention should be considered. The retention of a well designed set of dentures need only be strong enough to keep each denture in position during functional activities other than mastication. If more than this is attempted in the average difficult case, the afterthoughts of the patient and dentist may not be so pleasant to contemplate.

The amount of retention that may be obtained for a full impression may vary from mere adhesion to a marked degree of atmospheric pressure retention that will make necessary definite and forcible efforts to dislodge the finished

*Read before the Midwinter Clinic of the Chicago Dental Society, Jan. 27, 1927.

denture from its seat in the mouth. Should extreme retention be necessary to the successful use of dentures by any patient, 90 per cent of the edentulous would be unable to wear artificial appliances at all.

The maximum retention possible for a favorable case should not be the ideal for all cases. Each case is a law unto itself, and the less one is required to compress or displace tissue or extend the impression margins at rest so that functional activity of adjacent tissues is interfered with, the more satisfactory the final outcome will be.

Not the least objectionable feature encountered in promising or working for retention without considering muscle and nutritional functioning is the adverse effect produced on the attitude of the patient from loss of retention that occurs from traumatic pressure change or reduced retention when soreness is relieved.

Impression technic may be the cause of loss of retention. This is a certainty. However, all failures in retention of dentures are not due to faulty impression technic. The degree of accuracy necessary to make a satisfactory full denture impression is more susceptible of variation without injurious results than is the degree of accuracy employed in registering central occlusion or in working out a balance in the contact of the opposing teeth in various lateral or protruded occlusions.

When either denture is well retained during speech and displays a fair degree of stability to digital examination when placed in the mouth singly but is dislodged when used with the opposing denture, do not seek for the fault in impression technic until you have thoroughly checked the various functional relations of the dentures, starting with central occlusion.

The better one works out central occlusion and balance in the articulation of the teeth and perfects these things in the mouth, the less will be the necessity for resorting to technic that holds the denture in place against the tipping or dislodging stress of faulty occlusion. Faulty occlusions may, on the other hand, cause traumatic pressure on the lingual bicuspid region of the mandibular ridge or the palato-incisal region of the maxillary arch, with subsequent loss of retention.

Afterthoughts point to the flat contradiction of a line of reasoning broadcast some years ago, and still prevalent in the mind of the profession. This statement implied, in substance, that if we got the impression right, it did not matter how careless we were about articulation, the denture would work. This is not only erroneous but it is also positively dangerous to the patient, as technic necessary to get such a result, temporarily as it usually is, may be a cause of marked resorption, and sometimes almost complete destruction of the osseous alveolar ridge when it is employed several times in succession in an effort to maintain the "good" fit the patient has been miseducated to demand.

If you are not inclined to feel that the members of our profession look to the impression as the best avenue to results, recall the crowds and interest displayed in an impression clinic, and contrast this with the sparse attendance at clinics dealing with central occlusion or articulation occurring at the same time.

The permanence of retention of dentures during function and the comfort with which they may be worn if

carefully made depend on visible and invisible factors other than the physical characteristics previously discussed.

The visible factors are those that may be found by a visual and digital examination of the mouth. The invisible factors are those within the patient's body or oral tissues, the possible effects of which are not distinguishable for some time after dentures are inserted.

The visible factors may influence one's choice of technic. They determine, to a certain degree, what a patient may expect of dentures as far as they favor such mechanical advantage as may simplify the patient's problem of using dentures. The visible factors are not an absolute guide or a reliable index for prognosis, especially if the patient is being fitted with a first set of dentures. Promises made to an inexperienced denture patient based on visible factors are an indication of the dentist's good intentions and also of inexperience. No operator should ever promise anything but an honest effort to employ his full skill and experience in treating his patient's case. If he does more than this he is laying himself open to the suspicion of incompetence and to loss of valuable time in attempts to make good his promises when the unfavorable unknown factors get in their work, and he may arouse in the patient's mind expectations impossible of fulfilment.

To illustrate this, let me cite three cases in which the visible factors were favorable.

REPORT OF CASES

CASE 1.—A woman, middle aged, who had lost her teeth as a result of pyorrhea and focal infection, was fitted with dentures, which, when inserted, exhibited remarkable retention. The patient was able to bite pieces out of a hard apple and masticate successfully and comfortably from the moment dentures were fitted. Six weeks later either denture exhibited a semblance of stability or retention. They were rebased. Eight months later, the same loss of stability and retention was observed. The dentures were rebased again, and retained their stability and retention for almost two years, when they again required rebasing. The patient has not since appeared for treatment and seems to be comfortable and satisfied.

CASE 2.—A man, aged 28, suffering from tuberculosis, had, because of extensive caries and some peridental disease, been advised by the hospital staff to have twenty-four teeth extracted. Ten days later, the patient proceeded to a sanitarium wearing full dentures. His mouth, at time of his departure, was too sore to permit tests of retention, which seemed to be moderately good. Two years later, the patient returned. Both dentures exhibited excellent retention and stability to all tests, but required some relieving of flanges where they were impinging on border tissues. About eighteen months later, retention of both dentures was still excellent and no soreness was apparent. The facial expression indicated that there had been an extensive loss of alveolar tissue with closing of the bite, in the four years the dentures had been worn.

CASE 3.—A woman, aged 38, had a full upper denture and a bilateral partial lower, supplying four molars. The upper denture was retained in all tests in a most satisfactory way. The patient complained that the denture constantly dislodged while she was eating. A test lunch disclosed the fact that, in mastication, this patient crushed food particles by closing in central occlusion and ground the food by thrusting the mandible forward or to the side; just the reverse of the usual procedure. No amount of effort or persuasion could induce this patient to try to change this unfavorable habit.

The self critical dentist might blame his impression technic for the good or bad results in these cases, when, in my opinion, the unknown factors presented by the patient in each case were the cause of the abnormal results obtained.

The visible or known factors are:

1. The visible condition of the tissues that will be used in supporting dentures.

(*a*) The state of health, such as the presence of inflammation or surface irritation of the mucosa, or trauma from extraction.

(*b*) The thickness of the mucosa.

2. The oral secretions.

3. The form and size of the denture base area.

The health of the mucosa at the time of impression making is important. Any irritation in the form of swelling or hypertrophy present in the mouth should be reduced by the use of mild antiseptic washes and rest from an offending denture. A most valuable aid in such procedure is found in the form of surgical solution of chlorinated soda (Carrel Dakin solution) when used as a mouth wash every three hours in a solution of 15 drops to a glass of water. When irritation is caused by the dentures being worn, it should be relieved to avoid further irritation and the dentures should be worn only at meals for a period of not less than forty-eight hours before impressions are taken. When this is not possible, owing to the nature of the activities of an individual, the offending denture or dentures should be temporarily rebased with compound and kept out of the mouth during periods when their use is not a necessity, until the inflammation is reduced. Failure to observe these precautions has resulted in a loss of retention owing to a leak caused by the resolution of the irritated tissue with consequent reduction in thickness.

Irritation due to extraction should be permitted to subside for ten days, at least, before dentures are constructed. I am not one of those who favor the insertion of dentures immediately after extraction, as, in some instances, where infection is deep seated, this procedure produced irritation that might have ended disastrously. The only excuse for such a practice is a desire to cater to the wishes of a patient, as against the logic of the good surgical procedure of allowing free drainage. Were the mouth not the habitat of many varieties of bacteria, or if denture patients could be relied on to follow instructions, immediate denture insertion might be accomplished without added chance of infecting the osseous ridge tissues and causing subsequent irritation and discomfort.

The most difficult cases the careful technician has to handle are those for which impressions have to be made after extraction. While such conditions do not greatly impede normal procedure, the after-effects that come from normal reduction in size of the ridges due to healing and regeneration of the traumatized areas produce a reaction on the mental attitude of the patient that it will require years of concerted effort in educating the public to eradicate. It is an open question in my mind as to what procedure should be followed to give the recent extraction patient the best results and cause the operator the least loss of income through expenditure of time that custom makes it difficult to collect a fee for. While it is not rightly within the scope of the subject of this paper, it is a fact that, from the standpoint of difficulty and after-treatment required, the fees for constructing good dentures shortly after extraction should be larger than for constructing dentures for patients who have previously worn them. The trouble that a patient who is already run down before teeth are removed may cause a dentist and blame him for would fill volumes.

It requires about a year and a half for tissues from which teeth have been extracted to assume a normal edentulous ridge state, and while reaching this condition, much trouble attributed to faulty impressions may occur. Many a conscientious, careful operator has suffered loss of reputation and patronage by failing to recognize this fact and impress it on his patients or owing to failure to get them to believe it, if he did speak of it. The general practitioner should take cognizance of this fact and preach it or do as the practitioner in the country often does: let the patient wait for a year or so before making dentures for them. The trimming off of spines and reduction of the buccal plate in anticipation of future loss of tissue even when conservatively done has had no saving grace when applied to patients past 40, except to eliminate some immediate soreness.

Thickness of healthy mucosa is probably the most important single factor in successful denture construction and the hardest to describe adequately. Not the least function performed by the mucosa is its adjustment to an impression to fill up defects that would permit air to enter under the seated impression, as well as a like adjustment to unavoidable slight inaccuracies that usually exist in the fit of the bases of the most carefully constructed dentures.

As far as retention is concerned, the thickness of mucosa on which the peripheral margin of an impression is seated seems to determine the degree of retention possible. When the mucosa in this region is of such thickness that it may be indented about 0.5 to 1 mm. without pain, and when the mucosa covering the alveolar ridge internal to the peripheral region is thin enough to permit the least degree of rotational movement of the impression, we have the ideal condition for maximum retention and stability of a denture.

Impressions of mouths presenting conditions such as described, regardless of ridge form, present few problems for the impression novice. When the peripheral tissue presents a break in the continuity of a yielding area by the interposition of hard areas, the condition, as respects impression technic, is quite different.

Excessive soft tissue, especially when located in the mandibular alveolar ridge crest area or when covering most of the anterior third of the maxillary ridge and palate, presents a particularly difficult problem, and especially so if, in the latter instance, the posterior section of the palate is covered by a thin mucosa of drumhead consistency. The presence of much soft tissue overlying in folds the lingual margin of the mandibular ridge also causes a decided interference with ideal results.

Efforts made in early experience in this field to displace or compress such excessively soft areas, or resorts to removing such areas surgically, have, on afterthought, been discontinued. Such soft tissue conditions, when localized, are the result of trauma or cover low-grade infection. If radiographic evidence of infection, such as demonstrated by Colburn and Jackson, is present, the area of infection should be removed, and with it a sane amount of the soft tissue. When an excessive amount of soft tissue is removed, resulting dense scar is often worse to contend with than the original soft tissue.

Efforts to reduce this tissue by pressure are usually unsuccessful; in fact,

they supply another type of traumatizing influence that seems to aggravate the trouble, and this is especially so if the soft areas cover an area of infection which the patient declines to have removed.

Impressions should be made so that but slight pressure will be sustained by such areas, or they should be relieved; for compressed soft tissues retain their stress-resisting form only while pressure is applied to the denture, and at other times expand and partly unseat the denture.

It is much better practice to obtain a secure bearing on adjacent hard areas in the palate and on the buccolabial surface of the alveolar ridge than to attempt to compress soft, flabby or cartilaginous pendent tissues. This idea may, with advantage, be carried out in extreme cases by omitting relief on the anterior surface of the median palate, especially if the alveolar ridges are much resorbed.

The most difficult tissue condition encountered is met with when a thin, hard, drumhead-like mucosa covers the entire denture base area of the mouth and terminates in a mucous membrane pocket between lip and cheek covered by tissues of similar consistency and accompanied by several frenum-like bundles of dense tissue arising from the peripheral seat area of the ridges in the tuberosity regions, the bicuspid regions of the upper or lower ridges and the frenum regions of the lower. Such mouths are usually most easy to treat by using a muscle-trimmed approximate fitting tray and plaster. The periphery of the finished denture may have to be made of a velum-like rubber to supply in the flanges of the denture the slight resilience necessary to secure a valve seal. In such cases, I do not hesitate to employ the old vacuum chamber, rather large in area and shallow. The scratching of a retention line in the periphery of the maxillary cast about 2 or 3 mm. in from the peripheral edge of the impression may help as a last resort.

Scanty or thin saliva usually spells trouble in securing retention, and aggravates the difficulty when accompanying a hard mucosa. In describing the liquids present in the oral cavity, some teachers apparently include the mucinous discharge from the tissues of the hard and soft palate with the saliva. This is not correct. Excessive discharge of mucin from the tissues of the palate often causes a decided interference with ultimate successful denture retention, and is usually stimulated by the insertion of a new denture. Saliva discharged from the salivary glands rarely causes any trouble except when there is little of it. No successful remedies for overcoming scantiness of saliva or continued excessive mucin discharge are known to me. Fortunately, mucin discharge usually ceases if the patient continues to wear the denture. When the mucinous discharge is present in the mouth at the time of impression-making, it should be carefully swabbed away before the impression is taken and during the process of correction, if the correctible technic is employed.

The size of the denture base area is relative to the size of the patient, and usually is not an important factor in impression technic prognosis, for this reason. When a very small, flat upper denture is related to a large lower, the problem has to be worked out in the mechanics of denture construction rather than in the impression technic.

The form of the ridge area should

be surgically corrected if prominences exist that interfere with peripheral adaptation. In correcting ridge form to permit the best results in impression retention, do not advise changes that interfere with esthetics or that increase difficulties due to ridge relation in central occlusion, such as cutting away prominent ridge tissue in the incisor region of the maxillary arch when a prominent mandibular ridge with or without teeth is present. The greatest caution has to be observed in such cases as the subsequent restoration of expression necessary may subject the maxillary base area to unnecessary strain if much reduction of osseous tissue is attempted.

The invisible factors that ultimately, in the mind of the patient at least, lead to questions concerning impression technic efficiency are: 1. Invisible irritants within the tissues covered by the impression. 2. The health and resistance of the patient. 3. The natural or acquired resistance to pressure of the tissues to be covered by the impression.

Invisible irritants within the tissues that support a denture may be in part disclosed by good radiograms. Such irritants as impacted teeth, pieces of root or particles of broken fillings have caused trouble that was at first attributed to faulty impression technic. The removal of the irritants remedied the trouble.

Infection that is not removed, or, if removed, recurs, accounts for many a sore spot and many cases of lost retention that no impression technic can care for in advance. When continued localized recurrence of irritation or atrophy occurs over a period of months or years despite careful procedure, there is little hope that it may be ended without opening up the tissue to find out what is wrong.

The patient who has, by circumstance, been forced to part with teeth decayed and aching but with no periapical infection presents a much more favorable case for full denture treatment, as regards both immediate comfort and relative permanence of results after the first year has passed, than the one who has had extensive dental treatment including many root fillings followed by periapical infection preceding or determining the resort to extraction.

The mothers that some of our patients tell us about who wore one set of dentures for forty years were no doubt in the former class, while the daughter who relates this story is probably telling it because she is in the latter class.

Experiences with these two classes of patients may give the general practitioner much food for thought as to whether he should jeopardize the patient's health and future comfort with artificial dentures by treating and retaining doubtful teeth in an unfavorable environment.

Ill health and lowered resistance of a patient should be an index to warn against efforts to produce great retention. The best that can be done for sufferers from chronic systemic disease is to reconstruct the dentures when irritation requires, avoiding any procedure that might cause traumatizing pressure.

The resistance to change under pressure of the tissues covered by a denture may be slight in patients who have worn ill-fitting dentures for many years. The increased pressure placed upon supporting tissues by the increased use a patient can give well-made dentures sometimes stimulates a resorption that

causes looseness or loss of retention in a few months. When this occurs, do not think that the impression is entirely to blame. You may be surprised to find that a second set of new dentures will continue to function for a long time when made in exactly the same way as the first ones. The only way to account for the repeated occurrence of such experiences is to credit the tissues with acquiring a resistance to the increased use that they are put to in the interval that the first dentures are worn. Care in impression technic may help to reduce such cases, but no amount of care can eliminate them entirely.

When we review the many causes for loss of retention which, I believe, have commonly been laid at the door of impression technic, in the disappointment that followed their pernicious effects, we should be urged to apply a rational procedure to impression technic. We will not act amiss if we proceed always with the feeling that the less stress we create on tissues from any cause, the more nearly permanent will be our results.

Technic that may yield impressive results of a qualified permanent character in one case may be productive of rapid destructive change in another. The sane method of procedure is to adopt a technic that will be productive of the least inequality of pressure on the stress-bearing tissues. Spectacular results in impression technic are usually the result of a procedure that produces unnecessary pressure on the soft mucosa, especially on the palate tissues of the maxillary arch. After many experiments with methods that promised conservation of time over the usual muscle trimmed impression in compound, I still feel that the choice, whether by chance or intent, of those who used an approximately fitting tray filled with a thin layer of soft compound, rather than a hard mass of compound, the surface of which is heated, was wise. The results obtained with the former technic are not so spectacular always as those obtained by the latter, but the results in the mouth are more likely to continue to meet the requirements after several months or years. In addition, no false expectations, impossible of continued fulfillment, are aroused in the patient's mind.

Whether the impressions are made in compound or plaster, the results recounted lead to the conclusion that an approximately fitting tray filled with a small amount of plastic material will produce the most permanent results.

Some new materials, produced by one of the oldest manufacturers of compound for impressions, have been found of considerable value. A new soft tracing stick, identified by a green color, is used for correcting defects, building up the margins of impressions to produce valve seal and to prepare for muscle trimming. It is soft enough to trim readily without undue heating and to obviate some of the danger of producing too great pressure on the buccolabial periphery, a frequent error in the use of the regular tracing stick. A second material made available from the same source is a maroon-colored compound, setting harder than the regular variety, which, used either straight or mixed with the regular, sets hard enough to retain its shape at mouth temperature during tracing or muscle trimming without tedious cooling precautions.

I continue to find compound, correctible impressions the most satis-

factory for the majority of impression work, as this technic lends itself best to special treatment of varying tissue depth, frequently found to be the cause of difficulty in securing retention. It also resists admixture with saliva, an advantage appreciated by those who take time to use it properly when dealing with the mandibular ridge. Plaster has its place, particularly when impressions of hard surfaces are to be made. Here, it is the most satisfactory, and especially so in the construction of removable and fixed bridges.

Whenever the appliances are constructed to be supported by the mucosa, compound is the best material. When clasps are employed as retainers, compound may be used in conjunction with plaster, which is employed to take impressions of the teeth to be clasped.

SUMMARY

There are many factors that may cause loss of retention of dentures that are not traceable to impression technic.

The use of tight-fitting impressions as a means of avoiding the labor of securing correct centric and other occlusions in the finished dentures is a snare and a delusion.

Impressions should be obtained with the least pressure possible, consistent with securing adaptation of the material to the mucosa.

Instead of trying to create stability of dentures by compressing soft tissues to a degree of rigidity sufficient to afford a firm foundation, relieve pressure on the soft areas and secure stability by permitting the impression to seat on adjacent hard areas.

Do not overlook the fact that, after extraction, the alveolar ridge tissues usually continue to recede for a year and a half, which causes much annoyance to the patient. The dentist should not feel obliged to continue to treat irritation due to this process, without compensation.

116 Central Park South.

BIOLOGIC DEFENSE IN INFECTION*

By PALMER FINDLEY, M.D., F.A.C.S., Omaha, Nebraska

OF late years, the dental profession has been deeply engrossed in the subject of focal infection. All through the ages, rheumatic disorders have been the despair of the medical profession, and it is no wonder that any procedure that promises relief from the plague of painful creaking joints, aching muscles and lancinating nerves, especially if endorsed by high authority, is received with enthusiasm by those charged with the responsibility of relieving suffering and correcting crippling disabilities.

In their attitude toward focal infections, the dental and medical professions have run true to form. They have allowed their zeal to run riot, while but a few weighty voices have attempted to stem the tide. So great has been the zeal of the exponents of focal infection that it would seem the citadel of reason had been razed and the host of crusaders had triumphed over all that had been cherished by the two professions. The old surgical axiom "Save what can be saved" has given way to that of "Destroy to the uttermost!" A devitalized tooth is declared to be as dangerous as the bite of a venomous serpent, and the statement that "there is no such thing as a healthy tonsil" is openly defended. As a result of all this, the human race bids fair to march from the cradle to the grave as toothless as the proverbial barnyard hen, and the tonsil which has, for some mysterious reason, been lodged between the pillars of the throat by the Great Architect of the human body is doomed to extinction. While this reign of terror is spreading through the land, there has developed a host of victims who have enjoyed their last good meal, and while all are sans teeth, sans tonsils, sans money, sans everything but regrets, not a few have no relief from their rheumatic disorders. Slowly but surely, suspicion has given way to conviction that not all the ills to which flesh is heir emanate from infected teeth and tonsils, and evidence is not wanting that both the dental and the medical profession are now making a serious effort to discriminate between teeth and teeth and tonsils and tonsils. Unquestionably, the ebb tide has set in, and will go on until a rational middle ground between the radical and the ultraconservative is attained. May we speed the day when every tooth that is fit for masticating will be saved and when the function of the tonsil may be made known and sacredly preserved.

I believe in focal infections and have evidenced my convictions by voluntarily sacrificing most of my teeth and all of my tonsils. I have advised many of my patients to go and do likewise, but I venture the assertion to the peril of

*Read before the Nebraska State Dental Society, May 20, 1927.

professional ostracism that not all the ills that infest the human body are due to infected teeth and tonsils as some would have us believe. There is a need for a closer analysis of this problem and for a careful and persistent followup of our cases, to the end that we do not make needless sacrifices and that we know just what results we are getting.

I profess to know nothing of dentistry and little of throat affections, but I am unalterably committed to the dictum that the fundamental principles governing the infections apply alike to all parts of the body. There are no laws governing the infections of pelvic structures that do not apply with little variation to infections of the throat and jaw. A not inconsiderable experience with pelvic infections that are every whit as common as infections of teeth and tonsils leads me to affirm that in not a single instance have I been able to connect a chronic infection in the pelvis with disseminated foci of infection in remote regions of the body. Where any considerable amount of pus is confined to the pelvis over a long period of time, we may expect to find evidence of a general sepsis of varying degrees, but we do not find the lesions generally ascribed to focal infections in teeth and tonsils. So far as I am aware, the same types of organisms exist in pelvic infections as in the jaw and tonsils. And we ask why, then, are infections in and about teeth and tonsils so prone to disseminate? Admitting that all clinical evidence points to the fact that they sometimes do, what, then, is the explanation? I can only assume that the explanation lies in the difference in biologic defense in and about the infected organ.

I am not aware that any extended observations have been made by dentists and tonsillectomists on the biologic defense against infections in and about infected teeth and tonsils, and I offer merely by way of suggestion a brief account of the manner in which natural forces have placed a barrier to infection in the pelvis. I do so in hope that the suggestion may inspire a greater zeal for conservatism on the part of those who earnestly strive to reach a rational basis for dealing with the problem of focal infections as applied to teeth and tonsils.

In every labor and abortion, a wound is created at the placental site—this is inevitable. It has been demonstrated that, by the fourth or fifth day of the puerperium, micro-organisms capable of causing infection are found in the uterine cavity in at least 80 per cent of all cases. Yet the vast majority of these cases remain fever free and show no inflammatory reaction in the wounded tissues. How, then, is the integrity of the structures preserved? Why do these virulent germs fail to infect and invade the puerperal wound? The answer lies in the presence of cellular elements which have the power to resist the attacking micro-organisms. It has long been known that the decidua of the pregnant uterus is beset with small, round cells. These cells possess the power to destroy micro-organisms and to rid the tissues of cell débris and blood pigment. They are called phagocytes. This protective zone of infiltrating phagocytes may be called the first line of defense, and it is there in advance of the micro-organisms which are capable of causing infection. When the micro-organisms attack the wounded surface, these phagocytes

greatly increase in numbers. If, perchance, the attacking organisms are of great virulence and in large numbers, the first line of defense fails to hold against the frontal attack of the invading organisms, and as the organisms invade the underlying structures of the uterine wall, additional phagocytes are marshalled, until the whole wall of the uterus is infiltrated with these small round cells. This is the second line of defense. While this is progressing, the connective tissue at the side of the uterus, in the base of the broad ligaments, is participating in this defense mechanism. Certain characteristic cell elements called macrophages are seen to appear along the lymph channels of the connective tissue within the broad ligaments. They have been recognized as early as the third month of pregnancy and they increase in numbers to the end of labor. In the event of infection, the number of these cell elements increases greatly. This is the third line of defense. These cell elements are known to be phagocytes because they are seen to contain within their cytoplasm cell-débris, blood pigment and micro-organisms, and they take the characteristic neutral red stain. And so, in the pelvis of women, Nature is forearmed against infection by a cellular defense mechanism, and this in advance of infection. And in event of infection, this defense is reinforced in the uterus and in the neighboring structures. Because of the presence of this biologic defense, the infecting microorganisms are prevented from invading the tissues. Were it not so, the vast majority of all child-bearing women would suffer infection. We, as obstetricians, have long since learned to conserve this defense mechanism which Nature has provided. We no longer create unnecessary wounds by scraping the decidual surface, nor do we, at the onset of infection or at any time in the course of infection, be it in the acute or chronic stages, remove Nature's barrier by means of instruments. To do so would too often result in the spreading of an infection which otherwise would have remained localized and relatively harmless. These things we have learned through bitter experience. The surgeon has discarded the curet in the treatment of infection, and the dentist has adopted it. Thomas Emmet called the curet "an instrument of the devil" because of the mischief done by its use. The mischief done was the removal of the cellular defense which we have learned to safeguard as a valuable adjunct to any contribution that we may make in the control of infection. A woman seldom dies of a pelvic infection unless she has undergone curettement or other equally meddlesome instrumentation. An analogous situation arises when, after extraction of a tooth and the removal of neighboring structures, there develops a widespread inflammatory reaction. Here, as in the case of an infected uterus that has been curetted, fresh wounds have been created and the wall of defense has been broken down. What general would wittingly remove his line of defense in the presence of an enemy unless he were ready to surrender?

Would it not be worth while to inquire into the probable presence of a biologic defense in the bony structure surrounding infected teeth? And if such exists, would you not be doing violence when you break down this barrier by operative procedures? When

you remove the alveolar process, are you not destroying the first line of defense?

I recently read an article[1] by Lester Richard Cahn, under the caption "Nature Her Own Oral Surgeon," in which he says, "The human system does not tolerate anything dead or necrotic. It makes a great effort to rid itself of all noxious elements. This is done to a great extent through its phagocytes." Thus, we have a suggestion of the presence of a biologic defense in the alveolar process. To break down such a defense mechanism would not be regarded as good surgery elsewhere in the body, and why in the jaw? Fundamental principles are eternal and must prevail in surgery as in society, and it ill-betides those of us who are confining our efforts to a highly specialized field of endeavor to violate these principles. Dentistry is but a part of the great system of medicine and surgery. It is not set apart from all else with laws peculiar to itself. I am not familiar with your problems in dentistry, but I do profess to know enough about surgical principles to question seriously the rationale of extensive alveolectomies as applied to infection. I cannot conceive of a like procedure applied to any other part of the body for the relief of localized infection. The general surgeon establishes free drainage of pus cavities and zealously preserves the surrounding wall of defense. He has faith in Nature's restorative powers and would never think of casting aside her contributions to defense against the invasions of infecting organisms. Have you not abundant evidence of the existence of restorative powers after drainage of an abscess is established? Otherwise, how are you to account for the healing of the wound after the extraction of an infected tooth? I assume no dogmatic position in this discussion and frankly admit my ignorance of dental problems, but I am sufficiently interested and curious to advance the foregoing queries as a matter of vital interest to the earnest seeker of the truth.

That there has been and still is an unwarranted amount of radical surgery done on the jaw is, I think, admitted by all workers in dentistry. History is but repeating itself. Excesses always follow in the wake of new ventures, and it takes time to find a rational basis for our activities. Dentistry is a comparatively young science, if indeed, it is yet a science, and being young, it is but natural that it should indulge in the excesses of youth. When the science of dentistry has attained maturity in years and experience, conservatism will be enthroned, and to the everlasting benefit to society. That cures have been made by the extraction of devitalized teeth no one will deny, but it is well to exercise restraint in judging results lest you fall into error. Cures are wrought in mysterious ways and quite beyond the comprehension of man. In the days when disease was thought to be an expression of the displeasure of the gods, there were cures by the offering of prayer and the making of sacrifices. The gray-bearded magician and the haggard old witch were the prototypes of the patent medicine vender of today, and they were not without their cures. Christian Science has relieved many a sufferer as have the cultists of all time. Often, in my personal experience have I relieved pain by the administration of no more po-

1. Cahn, L. R.: Dent. Items of Int., 49: 159 (March) 1927.

tent remedy than a hypodermic injection of distilled water.

Joseph L. Miller,[2] in speaking of the devitalized tooth before the Chicago Dental Society, said that the difficulty in judging of results from the extraction of devitalized teeth is that no one has used control observations. He selected 185 children suffering from arthritis, in eighty-eight of whom foci of infection were removed, and in ninety-seven, no attempt was made to eradicate foci of infection in tonsils and teeth. These cases were observed for varying periods of time up to five years, and in these periods of observation, there were 76 per cent of recurrences of joint affections where the foci of infection had been removed, and 97 per cent in the second group in which no attempt was made to remove focal infections. In short, there was little difference in results in the two groups. The suggestion follows that cases should be observed over a long period of time before arriving at definite conclusions. Conclusions hastily drawn are usually unreliable.

Are focal infections a menace to health? This question cannot be answered in the affirmative without qualifications. As Miller has pointed out, it is interesting to note that, in the past decade, which marks the advent of focal infections as a causal factor in a large group of diseases, there is now a notable lessening in the popularity of this theory; that in Europe and Great Britain there are few adherents. It may be said to be indigenous to America, and in America it may survive or perish. We have but to look back through the years on the countless fads and fancies that have come and gone in medical practice, to justify a conservative attitude. Almost within the memory of man the use of emetics, purging and blood-letting were practiced for almost everything from cancer to chilblains. You will recall that Brown-Séquard's elixir of life, a testicular extract, was once extolled as a restorer of youth and vigor. Ductless gland therapy has had its day, and a fast and furious day it was, often with little more rational basis than was displayed by the savages who ate of the heart of the lion to make them strong and courageous. Yet the medical profession "fell for it," and fell hard. Vaccine therapy was born and died within a span of fifteen years, but they were glorious, fruitful years for the misguided enthusiast and the charlatan. Such examples might be multiplied indefinitely, and we are forced to conclude that popularity even in the medical and dental professions does not insure permanency.

Again we ask: Are focal infections a menace to health? To determine this, we resort to animal experiments and clinical observations. The former method may be misleading, and indeed has led to erroneous conclusions. It is one thing to inject a culture from a pulpless tooth into a rabbit and it is quite another thing to contemplate the effect of a slow intake from a pulpless tooth to the human body. In the first place, it is reckoned that 5 c.c. of a bouillon culture injected into a rabbit would be the equivalent of nearly a half pint of the culture medium for a man weighing 160 pounds, and of course something is bound to happen to the rabbit as it would to the man. Then,

2. Miller, J. L.: Problem of the Pulpless Tooth as Seen by the Physician, J.A.D.A., 13: 535 (May) 1926.

too, this culture is introduced without giving time for local and general immunity to develop.

I think all will agree that a culture of virulent organisms in a tooth in the presence of remote lesions in the body such as rheumatic joints, endocarditis and nephritis is not evidence *per se* of cause and effect. And while we now may wisely adopt the rule of procedure of removing foci of infection when such remote lesions exist, it is unwise to sacrifice serviceable teeth on the hypothesis that, at some time in the future, such lesions as above mentioned may develop. In other words, the removal of a devitalized tooth as a preventive measure is unwarranted.

Clinical observations are more reliable than animal experiments in judging of results, but such observations are subject to many fallacies. The personality of the physician and dentist must be reckoned with, for suggestion is a mighty factor in the cure of alleged disease. Every physician of wide experience will testify to this fact. The fluctuations in rheumatic disorders chargeable to focal infections, as well as in many other diseases, are well known. The pendulum swings from better to worse and renders hasty conclusions unreliable and misleading. In judging our results from clinical observations, we would do well to follow the suggestions of Miller not only in observing our cases over a long period of time, but also in carrying out control observations of like cases in which foci of infection have not been removed.

CONCLUSIONS

1. Experimental and clinical evidence justifies the conclusion that focal infections in teeth and tonsils are prone to disseminate.

2. Unwarranted enthusiasm and high pressure salesmanship have led to needless sacrifices of teeth and surrounding structures.

3. Nature has provided a biologic defense against infection which should be safeguarded and not destroyed by operative intervention.

4. Alveolectomy breaks down Nature's defense mechanism, and is therefore unsurgical as a rule of practice, though probably justified in exceptional cases when there is a widespread necrosis.

5. Cases should be observed over a long period of time before arriving at a final conclusion as to results. Control observations are a *sine qua non* in drawing conclusions.

6. The extraction of a devitalized tooth as a prophylactic measure is, in the absence of pus, unwarranted. In the light of our present understanding, such teeth should be sacrificed only in the presence of lesions now alleged to be due to focal infection. It is to be hoped that, in the near future, even this indication for extraction will be superceded by more conservative measures.

Let me say, in conclusion, that if dental surgery is destined to pass through the successive stages that surgery in general has experienced, this *furor operativus* through which you are now passing will give way to a more rational and conservative attitude on the part of the dental surgeon. Discussions such as this can serve no better purpose than to speed the day when there will be a common understanding and a uniform practice.

CAUSES OF PERIAPICAL INFECTION*

By CARL J. GROVE, Ph.G., D.D.S., F.A.C.D., St. Paul, Minnesota

THERE are a number of important causes of periapical infection which time will not permit discussing in this presentation. It is difficult to determine which of these play the most important part in the production of periapical disease. Frequently, the factors associated with periapical disturbances existing before infection occurs influence or control the development of the disease; therefore, no one cause produces periapical infection. The etiology of periapical disease will not be fully understood until an exploration of all the important factors involved has been made.

One factor which will withstand the most critical inquiry but is not receiving the recognition it deserves, is the liquid diffusion which takes place through permeable root-canal-filling materials used by many dentists. Diffusion of equal importance takes place through the porosity sometimes existing in the secondary dentin deposited in the root canals.

In the laboratory experiments on which the foregoing conclusions are based, freshly extracted teeth were used, large openings being made into the pulp chambers. The teeth were then boiled in sodium hydroxid to aid in removing the tissue in the canal. A barbed broach was used to remove the remaining pulp tissue. The root canals were then filled with the various pastes or solution materials now employed, guttapercha cones, methylene blue being sealed in the pulp chamber.

The chief purpose of these experiments was to ascertain whether it was not possible for diffusion to take place through the lateral branches of the dentinal tubules. Different methods to bring about diffusion through the lateral branches were employed without success. Most of the dentin in the pulp chamber was cut away to give the coloring solution used access to all the lateral branches of the tubules.

Liquids extending into the permeable root filling also penetrated the entire length of the dentinal tubules to the cementum, but did not pass into or through the cementum. Colorization of the dentin occurred only where permeable pastes and solution materials were used, and where porous secondary dentin existed.

The conclusions to be derived from the results of these experiments are that bacteria have an avenue of escape from the dentinal tubules to the periapical tissue, infection resulting where permeable root fillings are used. Liquid nutritive material for maintaining the growth of bacteria in the dentin could also be carried through the permeable root filling, either from the periapical

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tissue or by diffusion through the open occlusal portion of the tooth with ill-fitting crowns and inlays, where the cement has been partly washed out.

In the face of these facts, there can be no uncertainty about the part these conditions play in the production of periapical infection, and they should, therefore, receive the serious consideration of all dental practitioners performing root-canal operations.

The practical value of these experiments is the demonstration that the essential physical properties of a root-canal material must be impermeable and that secondary dentin should be removed before the canals are filled.

When bacteria are present in the dentin of teeth with putrescent pulps, it is plain that periapical infection could result when root canals are filled with materials permitting bacteria to reach the periapical tissue.

A root-canal solution material possessing the essential physical qualities is rosin solution. In these experiments, I used a white rosin solution and gutta-percha cones.

In all the experiments conducted with the rosin solution, it was demonstrated that only a thin coating of the solution is required to seal the openings of the dentinal tubules. Teeth treated in this manner, with the root canals left open, were immersed in methylene blue for a number of days without any resultant colorization of the dentin; which proved that the tubules were closed.

The medical and dental literature has been replete for the past decade with articles calling attention to the fact that a growth of streptococcus is invariably obtained when root tips are snipped off and placed in culture mediums. The results of these experiments have been offered as proof that all pulpless teeth are infectious and should, therefore, be extracted.

The mere fact that a growth of streptococcus can be obtained by this method does not necessarily prove that such teeth are infected or infectious. The investigator's assumption is that streptococcus is obtained from the outer surface of the root end, whereas it may be obtained from the inner portion of the root by this method.

It must be remembered that, although bacteria may be present in the dentin, it is not possible for it to pass through the cementum to the outer surface of the root when the foramen is hermetically sealed. It would not be possible for bacteria to escape from the dentin to the periapical tissue; but when the tubules are filled with bacteria, it must be expected that a growth of streptococcus will be obtained in snipping off the root ends of such teeth, since a part of the dentin is cut off with the tips used in these experiments. The average thickness of the cementum at the apex is less than 1 mm., which would not be sufficient for these experiments. Since it is not possible to determine the thickness of the cementum before the root end is cut off, it cannot be maintained that only cementum is used in these experiments.

Periapical infection has its inception in that part of the membrane which folds into the foramen. In the destruction of this tissue, the underlying cementum is denuded of its covering and its nutrition; which may result in the death of the cementum, making it a foreign body productive of irritation, followed by further destruction of periapical tissue. It can hardly be expected

that permanent repair will follow any form of treatment where a chronic condition exists.

There are three causes for the destruction of these tissues: (1) mechanical causes, such as instrumentation and trauma produced by pressure of root filling; (2) infection through lack of asepsis in root canal operations, and also through permeable root canal filling materials, and (3) the use of drugs having destructive properties.

It is more than a decade since I first called attention to the fact that if the tissue existing in the foramen is retained, it is possible that cementum may replace this tissue. My opinion is that such teeth are no more susceptible to infection than teeth having vital pulps, provided the root canals have been properly filled. The periodontal membrane is attached to and covers this newly formed cementum as it does cementum on other parts of the root. It also supplies nutrition to this tissue. Root fillings composed of vital tissue, are ideal. Sometimes, scar tissue is formed instead of cementum, and it must be remembered that such tissue has a high resistance, which makes it far preferable to any known artificial root-filling material.

Success in this branch of dentistry in marked degree will not be attained by any root-canal operator who does not fully recognize the value of root end tissue.

Three chief causes for periapical infections are (1) a disregard for root-end tissue; (2) failure to observe asepsis to the fullest extent, and (3) the use of permeable root-canal filling material permitting the escape of bacteria from the tubules of the dentin to the periapical tissue. Pulp removal is not necessarily a cause of periapical infection.

THE HISTOLOGIC CHARACTERISTICS OF THE PERIAPICAL TISSUE WITH REGARD TO ROOT-CANAL TREATMENT*

By ARTHUR HOPEWELL-SMITH, Sc.D., L.R.C.P., M.R.C.S., L.D.S., Philadelphia, Pennsylvania

IN the limited period at my disposal, it is impossible to do more than present the outlines of my subject.

I.

The usual conception of the articulation tissues of the teeth, viz., cementum, alveolodental periosteum and bone, generally needs revision.

With regard to nomenclature, the soft fibrous connective tissue which acts as a fibrous gomphosis, and articulates the teeth firmly, solidly, and immovably to their sockets, is named variously the pericementum, periodontium, dental ligament, peridental membrane and periodontal membrane. Each of these

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terms implies merely a half truth, for the fibrous parts are equally attached to the osseous tissue, which may be equally affected by diseases of the tissue itself. The term "alveolodental periosteum" is the only correct designation for this strong attachment, as it forms, and is continuous with, the periosteum of the jaws, and possesses the same histologic features usually found in that periosteum which always covers the surfaces of bones; with the addition that, instead of being confined to the outer and inner surfaces of the alveolar bone, it also clothes the surface of the cementum. It thus intervenes between two hard calcified tissues—bone and cementum, and may therefore be regarded as a modified periosteum.

Composed of dense, immensely strong strands of wavy bundles of white connective tissue fibers and their cells and numbers of other cells, such as osteoblasts, on both its inner and outer aspects, with the frequent retention of the vestigial remains of the enamel organ known as the epithelial rests, and possessing an adequate blood-vascular, lymphatic and nervous system, its apical region differs in no important particular from that of its other parts, with the exception that it has passing across it the main afferent artery, the efferent veins, and the trunks of the sympathetic and sensory nerves distributed to the pulp. The so-called periapical tissue in man, unlike that of some of the lower animals, does not consist of what is called indifferent tissue, and is normally no wider than that elsewhere.

The alveolar bone approaches the confines of the orifice of the apical foramen as closely as it embraces the cementum generally, being similar in structure but not quite identical with the rest of the alveolar process of the jaws.

That the transitory nature, general inefficiency and great tendency to precocious atrophy of the sockets of the human teeth demonstrate that the articulation here differs from those of the other vertebrates is a fact which is beginning to be conceded by only a few observers. In spite of the existence of the lamina dura, the dental articulation is of a feeble character. The following reasons in support of this view may be adduced: (1) the unique nature of its histologic construction; (2) the inadequacy of its blood supply; (3) the absence of any muscular attachments, except occasional fibers of the buccinator muscle in the molar region; (4) its slight functional capabilities and possibilities, and (5) its lowered physiologic resistance to injury and disease, particularly the latter when the blood-vascular system is chiefly involved.

The foramina in the alveolar bone whence the trunks of arteries, veins and nerves issue are necessarily larger than the numerous openings into the medullary spaces of its other parts.

Neither bone nor cementum takes part in ordinary circumstances in the making of the walls of the apical canal and foramen. These are formed of dentin. Cementum is developed from within outward; dentin is developed from without inward.

II.

Root-canal treatment deals with diseased conditions not only of the pulp and tooth, but of the bone of the alveolar process also. An inflammation of the alveolodental periosteum is always accompained by, and cannot otherwise

than always be associated with, an acute, subacute or chronic inflammation of the bone of articulation. A dental periostitis means equally a local osteitis or osteomyelitis, as well as an osseous periostitis, and all their attendant consequences and complications.

It therefore comes about that root-canal therapy includes local bone treatment. In exceptional cases alone can there be complete restoration of the bone to its former status. When a foreign substance is introduced into a root canal, and extrudes through its orifice, it acts as a foreign body, inducing inflammation, and as a mechanical irritant, it is ultimately liable to be attacked and absorbed by phagocytosis, when the osseous tissue and the periosteum have not been inflamed to any considerable extent, and the blood supply has recovered itself.

If the inflammatory reaction to the injury has been too severe, the introduced material remains probably as an innocuous substance, and, unabsorbed, is tolerated by the living bone, which, if noninfected, probably undergoes sclerosis and an attempt at condensation; or, if infected, undergoes suppuration, caries and necrosis, with finally the formation of a cavity.

HISTOLOGIC FINDINGS IN TEETH WITH TREATED AND FILLED ROOT CANALS*

By EDWARD H. HATTON, B.L., M.D.; WILLIAM G. SKILLEN, D.D.S., and O. H. MOEN, Chicago, Illinois

AS early as 1873, Witzel claimed that the pulp stump, after amputation of the coronal portion, became calcified. Between his ideas and those of the present group of investigators, there is a wide gap, though there is marked similarity between the ideas of Witzel and those of Clyde Davis as to the relationship of amputation to calcification of the stump. The most extensive investigation of these changes has been made by the group at Zurich, who have studied their material from the anatomic, histologic, bacteriologic and clinical points of view. They call particular attention to the complicated form of the root canal, especially at the apex, and to the resorption of the canal wall that precedes reconstruction. The latter has been emphasized repeatedly by us. They have also described the invagination of the peridental membrane into the treated but unfilled portion of the canals, as suggested by Grove and by us; and lastly, they have found a large number of the treated teeth which they examined to be devoid of apical or pulp canal infection, as was to be expected from experimentation by Grove, by us and by others.

It is evident that a considerable mass of histologic evidence has been accumu-

*From the Research Laboratory of Northwestern Dental School, working under grant from the American Dental Association.

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lated indicating that, after the treating and filling of root canals, an interesting and characteristic reconstruction of the apical region occurs in all favorable cases, and that these teeth are devoid of histologic or bacteriologic evidences of infection. There are apparently three stages or phases to this process; namely, a destructive, tearing down process, a rebuilding phase and a terminal, resting condition of the tissues.

The first phase, the destructive stage, is characterized by a rapid resorption of necrotic soft tissue and of all absorbable débris, and a considerable resorption of the walls of the unfilled portion of the pulp canal. This resorption is produced by an invagination of blood vessels and adjacent tissues from the apex or pulp stump and is further effected by the activity of either fixed or wandering phagocytic and resorbing cells. These activities are profoundly influenced by the type of treatment used, and it seems that either instrumental or chemical injury to these apical cells inhibits both this preliminary cleaning out of the apical field and the subsequent reconstruction.

The second stage, that of reconstruction, consists of covering over the denuded surfaces of the canal with a layer of calcified material resembling osteoid cementum with typical lacunae and canaliculi. This layer is not of tubular structure and has no relationship to dentin. The filling material stump is covered by a layer of either fibrous or calcified tissue, and sometimes both. It would seem that the extent of this change is controlled largely by the laws that relate function or use to structural form. It is a rule that structures or tissues atrophy when not used. After a pulp chamber and the associated canals have been filled, it is clear that the demand for space in the apical portion of the root is gone, and the reduction of the amount of this space is caused by this change in function. How far the denuded dentinal wall acts as a stimulant for the deposit of this new layer of calcification is not clear, though, by analogy, it would seem to be relatively unimportant, since resected root ends rarely, if ever, have the denuded dentin exposed by the operation to the peridental membrane in the apical space covered by cementum.

After this calcifying process has come to a standstill, the third or resting stage begins. This lasts for years with but little alteration except for a gradual fibrous atrophy of the soft tissues of the stump lying within the spaces of the unfilled portion of the canal.

The preceding statement is a composite picture of the process. No two specimens are exactly alike, and the variations in result are influenced by the anatomy of the root, especially the number of accessory canals, the size of the main canal and the nature of the treatment.

Unusually large canals react unfavorably. This is not a new observation, as it has been known for many decades that teeth with uncompletely closed apices usually are not filled with any considerable degree of success. As far as we know, attempts to fill them always fail. It would seem that our attention had been focused unduly on the developing phase of such teeth rather than on the purely mechanical conditions involved in treating and filling such teeth, and that the problem is all one of size. It is difficult, if not impossible, to come to any other conclusion. Physiologic tissue activity seems to favor

rather than hinder regeneration, and young teeth should and do react more favorably than old teeth. Clinicians have repeatedly observed that root-end infections of filled molar teeth occur much more often on roots that have large, accessible canals than on roots that have small, tortuous, inaccessible canals only partly filled.

The large canals offer greater opportunity for injury to the apical tissues by instrumentation and have a greater surface for the absorption of drugs that may damage the soft tissues of the apical region. It is our opinion, then, that two factors in the failure of many teeth to react favorably after treatment and filling of the canals, are these: damage done to the soft tissues in the apical space by overinstrumentation or damage resulting from the absorption of toxic drugs by the same tissues.

The anatomy of the pulp canal especially, within the levels of the apical third, is not generally well known, and this in spite of the excellent monograph of Hess. This classic has been translated and abstracted in our journals, but our dentists are not familiar with it. The root canals, especially of the posterior teeth and in the apical third of all teeth, are complicated in form, and accessory canals are common even in the dentinal portions. We are speaking now of human teeth, not of the teeth of animals. This condition is so common that it is physically impossible to remove all of the soft tissues from the accessory canals and practically impossible to do so in many of the main canals without a preliminary reaming out of the walls so as to convert the portion of the canal to be filled into a slender, tapering cone, the base of which is directed toward the crown. One of us has just completed the examination of a series of teeth of which he has accurate histories, and these teeth without exception have many complications of the form of the canals. The small accessory canals are numerous and their arrangement is very complicated.

On the whole, the presence of these canals, especially in the apical third, does not interfere with regeneration. Infection in the small canals is extremely rare. We do not remember any instance in our specimens. On the contrary, it is the large canals that become infected and it is through them that the apical space becomes involved.

Incomplete filling of the canals has been constantly emphasized by clinicians as one of the common causes of failures. In most of the filling procedures, the use of the roentgenogram to control the steps in filling is urged. But the roentgenogram supplies evidence only as to the relative lengths of the tooth and the filling. Our specimens all direct attention to another type of incomplete filling that is not revealed by the roentgenogram and which I believe is much more important; namely, the incomplete occupation of the full diameter of the canal by the filling material. We have mentioned this type of incomplete filling repeatedly and stressed its importance in the production of failures in treatment. This type of incomplete filling is so common as to be present in more than three-fourths of the teeth that we have examined.

Probably no subject has had a greater discussion than that regarding the drugs which may be used in the treatment of pulp canals. Our own investigation of the effect of drugs is incomplete, yet some of the specimens that we have

accumulated seem very instructive. Where pulp preservatives have been used, as, for example, solution of formaldehyd or compounds containing it, most of the specimens still contain large portions of embalmed pulp tissues surrounding the guttapercha cones all the way from the pulp chamber to the apex, or the apical end of the filling. Contrary to what we were lead to expect would happen from the animal experimentation of the Zurich group, there is no noteworthy attempt made to absorb these embalmed pulps, and even the activity of the tissues at the apex is inhibited. These tissues at the apex tend to become densely fibrosed and correspondingly inactive.

Where arsenic has been used, the tissues are not completely embalmed, and if there is an effort at restoration, it is abortive, ending in a retrograde process in which only the fibrous tissue persists. This tissue atrophies, and a loose network is produced containing comparatively large spaces. On the whole, there is more absorption around the canals or at the apices of such teeth than there is new calcification; that is, the favorable constructive phase is paralyzed by the action of the drug, but the destructive processes are not greatly interfered with.

Our specimens seem to show that if operators use drugs, they depend on the drugs rather than on surgical cleanliness and a meticulous mechanical preparation of the canal in order to further proper placing of the filling material. Our specimens are crowded with examples in which the filling material has been thrust into drug-treated canals with only superficial attempts at removal of the soft tissue contents. Indeed, the examination of root-filled teeth breeds anything but respect for the average practitioner's technic. It is clear that a high proportion of inaccurate, unmechanical and careless root-canal work is being done.

At the present time, root-canal therapy is being discussed largely from two different points of view: one which mostly concerns drug therapy, and a second devoted largely to a consideration of the anatomic and mechanical conceptions of the operation. In some instances, the problem is attacked from both points of view. On the one hand, the discussion concerns the advisability of the use of caustic drugs and drugs that are protoplasmic poisons. On the other, the contention is directed largely to the type of operation. Shall it be a pulp extirpation of a type of amputation? The slogan "Since every pulp extirpation is in fact a pulp amputation, it is better practice to do a scientifically controlled amputation" has been broadcast widely by the devotees of pulp amputation, although the only adherent of the method in this country seems to be Clyde Davis.

As to the effect of drugs, our specimens lead us to believe that the use of strong, caustic drugs acts unfavorably on the regeneration that we have described; so much so that we believe and have suggested previously that the use of such drugs is contraindicated or limited. The same may be said of overzealous instrumentation. It would seem that if the tissues at the apex are diseased to the extent that instrumentation or drugging with caustic substances within the apical space seems necessary, such teeth should not be treated.

Concerning the discussion of the relative virtues of pulp extirpation and amputation, we have repeatedly said

that amputation is a technically inferior type of operation, a statement for which we have been severely criticized. On the whole, much of the histologic evidence that has accumulated indicates that probably a somewhat broader view is saner. It probably is more important to occupy the full diameter of the canal as far as the filling is attempted than to try to push the filling material down to the junction of the cementum and dentin at the apex, the latter at the expense of only partly occupying the full diameter of the canal.

Pulp canal treatment is at best a difficult operation, and if not to be well done, should not be attempted; but any reasonable modification of its technic in the direction of simplifying it should be welcome. In other words, while we do not desire to endorse pulpectomy or pulp amputation at the level of the floor of the pulp chamber as a routine procedure, neither do we wish to condemn a method of filling root canals that does not bring the apical end of the filling to the junction of the cementum and dentin at the apex. The selection of the level at which to end the filling is, we believe, a problem of accessibility.

DENTAL PULP CASE HISTORIES AND ROOT CANAL FILLING RECORDS*

By EDGAR D. COOLIDGE, B.S., D.D.S., Chicago, Illinois

WHAT is the established basis upon which to determine the success of root canal treatment and filling? The time has gone by when the comfort and usefulness of a pulpless tooth can be a safe basis of diagnosis. In the survey of roentgenograms, it has become quite customary to condemn teeth showing periapical bone absorption and often those showing little pathologic process are sacrificed. It is a rare thing to have an inquiry into the case history of a tooth made by another operator, and few patients are well enough posted to give specific information regarding the history of a pulpless tooth. Hasty judgment and a lack of information have lead to the loss of useful pulpless teeth that show good canal fillings but in which, owing to some disturbance as yet not fully understood, there is apparent disease in the periapical region. Frequently, a patient enters the office of a physician or another dentist for consultation, when diagnosis and judgment are given on a basis of the roentgenographic findings, regardless of the history of the work done on pulpless teeth. Not uncommonly periapical disturbances follow good canal treatment and filling, sometimes involving the bone. Such conditions can rarely be differentiated from infected areas and granulomas about teeth that have not

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had good treatment, and to extract all such teeth without a consideration of the history of the work on the tooth might be to deprive the patient of a useful tooth, which would soon be surrounded by a normal periapical tissue and alveolar bone.

A system of accurate and easily kept records is an essential item in the success of root-canal operations. The method used by me was suggested by A. D. Black.[1] It has been changed somewhat and additions have been made from time to time as the work has demanded. It consists of a blank outline printed on the face of an envelop, to be filled in at the beginning and close of each operation on the pulp and root canal. A space is made for diagnosis, method of pulp removal, drugs used, method of sealing the dressing in the canal and the record of the canal filling. All roentgenograms of the tooth are kept in the envelop and every bit of the history of the case, from diagnosis to canal filling, is recorded on the face of the envelop. As the patient returns year after year, all subsequent roentgenograms and remarks are added to the record of the case on the envelop.

The pulp cases are divided into four divisions for convenience and study as follows, and the records are transcribed in a ledger:

1. Treatment of vital pulps and removal by pressure anesthesia.
2. Treatment of vital pulps and removal by local anesthesia.
3. Treatment of dead pulps and pulpless teeth without periapical disease.
4. Treatment of pulpless teeth with periapical disease.

A record of all case histories, made during each year in the ledger under

Dental Pulp Case History

Name. **Age** **Date**

Address **File No.**

Tooth		Diagnosis														Pulp Removal					Treatment						Sealing		Root Filling							Sub. Ex. by Rad.					
		Pulp					Periapical Tissue																																		
Right	Left	Vital Normal	Vital Hyperemia	Vital. Caries	Gangrene	Old R. F.	Normal	Acute Abscess	Granuloma	Liquefac. Necrosis	Infection Cyst	Gingival Tissue	Press Anesth.	Infiltration	Nerve Block	Arsenic	Essential Oil	Creosol	Creosote	Iodin	Di-chlor. T	Cement	Guttapercha	Guttapercha	Chlor. P. & C. P.	Inaccessible	Good	Under Filled	Over "	Bone Normal	Bone Involved	Improving	Uncertain	Color Normal	Color Discolored
REMARKS																																								

Form employed in taking dental pulp case history.

1. Black, A. D.: Dent. Summary, 39: 749 (Oct.) 1919.

these four headings, separates the total treatment records into the four divisions and brings them into relation to each other so that individual cases may be studied to a better advantage. The value of these records grows each year as the new roentgenogram examinations are made and added to the record. It is possible to determine the percentage of success or failure of various methods of treatment or of the efficiency of drugs or the comparative value of the various filling materials for root canals. Detailed records bring to light many things that are of importance in canal treatment and filling.

In the study of records as described above, we found that periapical disease more frequently followed root-canal filling when pulps were removed by pressure anesthesia at the first sitting than when an antiseptic dressing was sealed over the pulp for a day or two previous to pulp removal.

In a twelve years' survey of such records, it has been possible to compare the percentage of successful root-canal fillings following the different methods of treatment of the various conditions of the pulp and pulp canals. The test of pulp treatment and canal filling is that a roentgenogram may be taken at any time at any angle and picture healthy periapical tissue and normal alveolar bone. Only those who regularly follow cases of root filling year after year realize what a laborious task it becomes as the records accumulate and the number of cases increase. When the value of such records is taken into consideration, it is found to compensate for the effort. Repeated examination reveals tissue changes following pulp removal in many cases, especially when severe pericementitis occurs during the treatment or following the canal filling. This pathologic process does not represent infection and, in most cases, it clears up within a year or two. However, it would be impossible to differentiate it from focal infection, and, without considering the case history, any other diagnostician would be inclined to extract the tooth.

The best results are found when the periapical tissue is not disturbed during the treatment or filling of the canal. This does not indicate that partial pulp removal is advisable by any means, but calls our attention to the nature of inflammatory reactions that take place after pulp removal in the vital pulp remnants and periapical tissue. Infection must be destroyed and the canal must be sealed with as little injury to the periapical tissue as possible. Inflammatory reaction following pulp removal may be accompanied by tissue absorption, and this might be mistaken for an acute or chronic infection or a granuloma by other diagnosticians. What filling material is used in the canal is not so important as how the case is handled during every step in the treatment and filling.

Records showing the drugs used during the treatment can be grouped to show a comparison of the effects of the periapical tissue. A comparison of the canals that are overfilled with those that appear to be filled to the foramen and those that are slightly underfilled over a period of years will demonstrate that overfilling is not desirable where

healthy periapical tissue surrounds the root. There are so many opportunities for injury or infection of the periapical tissue during the operations that it is exceedingly difficult to draw accurate conclusions regarding the effect of different drugs or methods of canal filling. The purpose of filling the canal is to obliterate the pulp cavity and the method employed or material used is not so important as the care used in every detail and the accuracy of the operation. The mastery of some technic is essential.

Records covering a period of more than twelve years reveal a larger percentage of successful canal fillings of roots that were pulpless than of those from which vital pulps were removed. This may be because the infected pulpless cases were handled with greater precaution, by the use of stronger antiseptics. It may be that inflammatory disturbances following vital pulp removal cause an absorption of periapical tissue and alveolar bone, which is later replaced by tissue of a different character that very slowly calcifies. Records alone cannot solve this problem, but neither can it be solved without records. We must study the microscopic picture of a series of such cases in which the history is complete, and determine what actually takes place in the periapical tissue subsequent to canal filling.

THE RELATION OF ORAL SPIROCHETOSIS TO PULMONARY GANGRENE*

By B. S. KLINE, M.D., and S. S. BERGER, M.D., Cleveland, Ohio

THE conception that pulmonary gangrene is a process in which necrotic lung tissue is secondarily invaded by putrefactive organisms is no longer tenable. Recent observations give evidence that this very serious and usually fatal disease of the lungs is produced by the presence of mouth spirochetes and fusiform bacilli and that its prevention is possible by proper oral hygienic or therapeutic measures.

HISTORY: OCCURRENCE

The presence of spirochetes in the mouth was first reported by Cohn[1] in 1875, (*Spirocheta buccalis*, anaerobe, motile, gram-negative, from 10 to 20 μ long, and 0.3 to 0.7 μ thick, with from three to ten irregular flat coils) and by Koch[2] (in 1877), (*Spirocheta dentium*, anaerobe, motile, gram-negative, from 4 to 12 μ long, with from four to twenty regular, very slender spirals). A third spirochete, smaller than the buccalis, but larger than the dentium and with larger and less regular spirals (apparently identical with *Spirocheta vincenti* [Vincent], and *Treponema macrodentium* [Noguchi]) was observed by Miller[3] (1883) in normal mouths, associated with a comma bacillus. This bacillus (subsequently identified as *Vibrio proteus*) is an aerobe, motile, curved, gram-negative, from 1 to 2.8 μ long, and 0.4 μ thick. The fusiform bacillus was first described as an inhabitant of the mouth by Vincent[4] (1899), who found it in the dental tartar of fourteen of eighteen normal subjects. This bacillus is a nonmotile anaerobe, straight, spindle-shaped, pointed at the ends, somewhat variable as to gram-staining (smaller forms at times positive, larger forms always negative), from 3 μ to 10 μ long, and from 0.5 to 1 μ thick.

In spite of these older observations of anaerobes in the mouth, there is still some confusion concerning the frequency of their occurrence. For instance, in a recent textbook of bacteriology,[5] the statement is made that the organisms of Vincent's infection are rarely if ever found in the healthy mouth. The fact that these organisms

*Read before the Section on Bacteriology, Pathology and Diagnosis at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

1. Cohn, in Meuse, Lühe M.: Handbuch der Tropenkrankheiten, Leipsic, 1906.

2. Koch, in Meuse, Lühe M.: Handbuch der Tropenkrankheiten, Leipsic, 1906.

3. Miller, W. D.: The Micro-organisms of the Human Mouth, Philadelphia, S. S. White Dental Mfg. Co., 1890, p. 80.

4. Vincent, M. H.: Ann. Inst. Pasteur, 13: 609, 1899.

5. Stitt, E. R.: Practical Bacteriology, Blood Work and Parasitology, Ed. 7, p. 547.

are present in large numbers in unclean and clean mouths is indicated not only by the observations recorded above but also by a study with H. Steuer (to be published) of the organisms in 372 mouths of diffierent grades. In this study, an arbitrary classification of mouths into grades A, B, C and D was made. A mouth showing no disease and no artificial restorations was considered as of grade A. A mouth showing no disease but some restorations was considered as of grade B. A mouth showing some disease and a number of restorations such as inlays and crowns was considered as of grade C. A typical pyorrheic mouth showing considerable disease and a number of restorations such as inlays, crowns and bridges was considered as of grade D. It was found that the Miller-Vincent organisms were present in the interproximal spaces in not only grade D, C and B mouths, but also in the vast majority of grade A mouths.

The cultural characteristics of mouth spirochetes and fusiform bacilli have been established, notably by Veszpremi,[6] Tunnicliff,[7] Muhlens,[8] Nogouchi,[9] Krumwiede and Pratt.[10]

PATHOGENICITY

The ability of these oral anaerobes to produce severe lesions has been maintained by a great many observers. Plaut,[11] in 1894, described five cases of angina caused by Miller spirochetes and bacilli, apparently in genetic relationship. In his communication, he states, "These Miller organisms are present in almost every normal mouth, mostly under the margin of the gums. When this is inflamed the spirochetes and bacilli are found increased." He also described the Miller bacillus as being motile, much larger than the diphtheria bacillus and, in contrast to it, pointed at the ends, and always in association with spirochetes. It is apparent that Plaut confused the comma bacillus of Miller with the fusiform bacillus. The first accurate description of the spirochete and fusiform bacillus in angina was made by Vincent[12] (1896). He expressed the belief that these two organisms dwelt in symbiosis. At the same time, Vincent reported the presence of these organisms, especially the fusiform bacillus, in cutaneous gangrene (hospital gangrene). Since then, one or more of the Miller-Vincent organisms have been reported as being present in noma, dental caries, and ulcerative lesions of the gums, of the external genitalia and of the rectum. Their presence in pulmonary gangrene was first reported by Rona[13] (in Hungary). Rona believed not only that these organisms produced the gangrene but also that carious teeth were their source. A year later, Castellani[14] reported from India two cases of hemorrhagic bronchitis simulating pulmonary

6. Veszpremi, D.: Centralbl. f. Bakt. Orig., 38. 136, 1905.

7. Weaver, G. H., and Tunnicliff, Ruth: Infect. Dis., 2: 446, 1905. Tunnicliff, Ruth: Infect. Dis., 3: 148, 1906.

8. Mühlens, P.: Deutsch. Med. Wchnschr., 32: 797, 1906.

9. Noguchi, Hideyo.: J. Exper. Med., 15: 81, 1912.

10. Krumwiede, C., Jr., and Pratt, J. S.: J. Infect. Dis., 12: 199, 13: 438, 1913.

11. Plaut, H.: Deutsch. Med. Wchnschr., 49: 920, 1894.

12. Vincent, M. H.: Ann. Inst. Pasteur, 10: 488, 1896; 13: 609, 1899.

13. Rona S.: Arch. f. Dermat. u. Syph., 74: 171, 1905.

14. Castellani, A.: Lancet, 1: 1384, 1906.

tuberculosis but caused by spirochetes. Since the publication of these reports, considerable discussion has been raised concerning the specificity of the spirochetes in these cases. Many observers support Castellani and consider them different varieties of one species, and believe that they inhabit only the deeper air passages. Others, since Rona's report, have felt that bronchopulmonary gangrene may be caused by various spirochetes (the Miller or Vincent type predominating), together with fusiform bacilli aspirated from gingival, dental, tonsillar or other mouth lesions.

Buday,[15] in 1910, for instance, reports thirty-five cases of bronchial, bronchopulmonary and pulmonary gangrene in which spirochetes, fusiform bacilli and comma bacilli were found in large numbers in the involved areas. In the bronchial lesions, the fusiform and comma bacilli were present in larger numbers than the spirochetes. In the gangrenous areas of the lung, the spirochetes predominated, innumerable organisms of this type being present not only in the necrotic tissue but also at the margins toward the intact lung. From a careful histopathologic study of his cases, Buday concluded that, in acute bronchogenic gangrene of the lung, especially of progressive character, spirochetes, fusiform bacilli and comma bacilli in the vast majority of cases are the causative agents and not secondary invaders. More important in establishing the etiologic relationship of these organisms to gangrene than their presence in early gangrenous areas and at the margins of more advanced ones is the fact that, with material containing them, similar lesions have been produced in animals.

15. Buday, K.: Zeigler's Beitrage, 48: 70, 1910.

EXPERIMENTAL OBSERVATIONS

In 1905, Veszpremi[16] reported the successful production of gangrene in rabbits following the subcutaneous injection of material containing spirochetes and fusiform bacilli. The material was obtained from a human being having suppurative periostitis, subcutaneous phlegmon, sanguinopurulent meningitis and lung abscess, lesions in which, as in the oral cavity, there were small balls containing large numbers of spirochetes and fusiform bacilli. Some of these masses were broken up and injected into rabbits, one of which developed a gangrenous peritonitis. Material from this source containing the anaerobes, when injected subcutaneously into other rabbits produced typical gangrene, with death resulting in a few days. Veszpremi, in a later communication,[17] stated it as his belief that, when the viability of tissue is diminished by disease, the organisms living in the neighborhood, including *Spirocheta gracillus*, increase enormously in number; that there is an increase in the virulence of the organisms also and that the process takes on a progressive character with the penetration of spirochetes into the tissue prepared for them. The spirochetes are aided by the fusiform bacilli, and under the influence of the cladothrix and other bacteria, the characteristic foul-smelling gangrene follows.

Additional evidence was presented by Kline,[18] who, in 1923, reported the pro-

16. Veszpremi, D.: Centralbl. f. Bakt. Orig., 38: 136, 1905.

17. Veszpremi, D.: Centralbl. f. Bakt., 44: 408, 1907; 45: 15, 1908.

18. Kline, B. S.: J. Infect. Dis., 32: 481 (June) 1923.

duction of gangrene in guinea-pigs, with death usually within forty-eight hours, following the injection into traumatized tissues of material not only from pulmonary gangrene but also from Vincent's infection, dental caries and ulcerative gingivitis containing innumerable mouth spirochetes and fusiform bacilli. In the material from the cases of Vincent's infection, these organisms were almost entirely the characteristic spirochetes, and fusiform bacilli. Furthermore, the microbic nature of gangrene was demonstrated by its production with these organisms after they had been passed through thirty-four guinea-pigs. Apparently conclusive proof that mouth spirochetes and fusiform bacilli are the causative agents of pulmonary gangrene was the production of gangrene of the lung in a rabbit by the intrabronchial injection of material from dental caries in which the mouth spirochetes and fusiform bacilli overwhelmingly predominated.

HISTOPATHOLOGY

The lesions observed in the lungs of human beings usually involve the lower lobes but have been observed in all portions. They are grayish green to dark green and have a penetratingly foul odor. The Miller-Vincent anaerobes are the predominating organisms in areas of early gangrene and at the margins of more advanced lesions. In spite of striking characteristics, gangrene of the lung is frequently, or rather usually, looked on by clinicians and pathologists as abscess. Although a distinct entity, gangrene is a complication of other pulmonary conditions, being engrafted usually on the inflamed lung of pneumonia, abscess or tuberculosis. It has been observed by Seecof (personal communication) complicating malignant tumors of the lung. Histopathologic and experimental observations strongly suggest that mouth spirochetes and fusiform bacilli are extremely virulent under certain conditions but are ordinarily kept in check by a complete tissue immunity. When the local resistance of the lung tissue is reduced (by inflammation, local anemia, tumor formation, etc.), these organisms exhibit their pathogenicity in striking fashion with the production of gangrene and usually cause the death of the patient. Occasionally in cases of gangrene of the lung, a serious complication is an ulcerative lesion of the brain containing the Miller-Vincent organisms.

CLINICAL MANIFESTATIONS

The clinical manifestations of bronchial and pulmonary spirochetosis have been described in a previous paper.[19] Of special note is the fact (a) that, in the majority of cases, there is an associated oral lesion, usually dental caries and ulcerative gingivitis, containing large numbers of the spirochetes and fusiform bacilli; (b) that many cases follow the extraction of teeth or tonsils and operations elsewhere under general anesthesia; (c) that the sputum, after careful washing, is found to contain the mouth anaerobes, and that soon after pulmonary involvement, it has a foul odor; (d) that arsphenamin therapy is apparently as specific in this as in other spirochetal infections; (e) that the observation of sixteen cases of pulmonary spirochetosis at Mt. Sinai Hospital,

19. Reference to fifty-two cases in article by Kline, B. S. and Berger, S. S.: J.A.M.A., 85: 1452 (Nov. 7) 1925; three cases by Rohdenburg, G. L.: Proc. N.Y., Path. Soc., Oct.-Dec., 1924, p. 177; one case by Marshall, M. Y.: Kentucky M. J., 23: 380 (July) 1925; nineteen cases by Smith, D. T.: J.A.M.A., 86: 1577 (May 15) 1926.

Cleveland, in the course of two years, gives a better idea of the incidence than the fact that only seventy-five cases have thus far been recorded in the literature of the United States.

PROPHYLAXIS

Since it has been shown that gangrene of the lung follows the aspiration of mouth spirochetes and fusiform baccilli, the possibility of its prevention by oral hygienic or therapeutic measures suggests itself. In clean mouths, the hygienic measures that have kept the spirochetes and fusiform bacilli in check within the interproximal spaces will suffice. In unclean mouths, where these organisms, having broken bounds and produced gingival, dental or other lesions, exist in enormous numbers, their destruction, perhaps best by the specific spirochetocides, by the arsphenamins, locally and if necessary intravenously, and by oxidizing agents locally, will insure the individual against the possibility of developing gangrene of the lungs.

In order to minimize the dangers of aspiration, these measures should certainly be carried out in all patients before operations in the oral cavity and before operations anywhere under general anesthetia.

CONCLUSIONS

1. Pulmonary gangrene in the vast majority of cases is apparently caused by mouth spirochetes and fusiform bacilli.

2. It develops usually as a result of the aspiration of material containing these anaerobic organisms, together with aerobic mouth bacteria. The latter produce an inflammation of the lung and thereby reduce its resistance. The conditions are then favorable to the Miller-Vincent organisms, which multiply, invade the inflamed lung tissue and produce gangrene. This serious complication may be engrafted on any acute or chronic pulmonary condition and, if untreated, is frequently the cause of death.

3. Arsphenamin therapy is apparently as specific in this as in other spirochetal infections.

4. Of greater importance than the treatment of pulmonary gangrene is its prophylaxis. In clean mouths, the hygienic measures that have kept the spirochetes and fusiform bacilli in check within the interproximal spaces will suffice. In unclean mouths, where these organisms, having broken bounds and produced gingival, dental or other lesions, exist in enormous numbers, their destruction, perhaps best accomplished by the specific spirochetocides, the arsphenamins, locally and if necessary intravenously, and by oxidizing agents such as sodium perborate, hydrogen peroxid and the chlorates locally, will insure the individual against the possibility of developing gangrene of the lungs. In order to minimize the dangers of aspiration, these measures should certainly be carried out in all patients before operations in the oral cavity and before operations anywhere under general anesthesia.

PARTIAL DENTURE CONSTRUCTION FROM AN ENGINEERING POINT OF VIEW, BASED UPON THE PHYSIOLOGIC REQUIREMENTS*

By ARTHUR PAUL LITTLE, D.D.S., Philadelphia, Pennsylvania

THE object of this presentation on partial denture construction is to consider from an engineering point of view some of the problems that arise incident to the practical application of this form of mechanical dentistry in restoring oral function. As we understand it, the term partial denture, in its strictest sense, implies all types of restorations placed in the mouth where any natural teeth remain. The consideration herein given will be directed only toward types of partial dentures that are removable.

Removable partial dentures are classed under two headings: the tissue-bearing partial denture, which transmits the load to the underlying tissue, and the tooth bearing partial denture, which caries the stress direct to the abutment teeth. As the functional and mechanical problems that arise in the use of either type of partial denture are vastly different, it will be necessary to consider them separately.

The problems attending the tissue-bearing type of partial denture presents the greater complexity. It is in this type that we are confronted with a law of physics, which is that stress cannot be divided between yielding and nonyielding areas. The tissues underlying the base are compressible or yielding and, as such, do not offer resistance to the stresses of masticating until they have become fully compressed. In each case, with the application of pressure on the base, the amount of compressibility will be governed by the quality of the mucosa. The purpose in constructing these restorations is to supply restorations to take the place of the missing teeth, and, as a substitute for these teeth, we expect them to function in part as did the natural teeth. The natural teeth have a definite limited movement. So small is this movement that, in comparison to the mucosa, the teeth may be said to be nonyielding.[1]

One of the functional responsibilities of a partial denture is to receive and distribute the stress to the underlying tissues and thus relieve the remaining natural teeth of undue strain. The chief obstacle we meet here is that, over one portion of the arch, we will be transmitting the load to nonyielding natural teeth, and over another portion of the arch, which is made up of our restoration, the load will be transmitted to

*Read before the Section on Partial Denture Prosthesis at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

1. Dresch, I. J.: The Relation of Prosthetic Restorations to Traumatic Occlusion, Dent. Summary, December, 1925.

yielding mucosa. Every operator is familiar with the picture the average tissue-bearing partial denture presents, after being in service for a period of time. Certain changes in the underlying tissues permit the denture to settle. No matter how well the restoration meets the requirements in the beginning, as regards its relationship to the remaining natural teeth, there will be produced on these remaining natural teeth, as a result of these changes, an overload which is bound to produce trauma to their supporting structures. The abutment teeth, that is, the teeth which carry the retaining agents, will be subjected to leverage that is not applied parallel to their long axis. Often, the retaining agent itself, when rigidly attached to the denture, will settle to a point where it exerts a pathologic influence at the free gum margin. If permitted to continue, this soon results in serious tissue and alveolar destruction. Any variation in the underlying structure directly affects the whole restoration, and this means that the occlusal balance will suffer in direct ratio to the tissue change, especially after recent extractions. Generally speaking, after a period of service in the mouth, those bearing restorations are in such a condition that they hinder, rather than aid, in the functional efficiency of the oral cavity.

An analysis of tissue-bearing partial denture construction shows that we are dealing with a more or less changeable condition, and that the changes which take place after the denture has been worn for a period of time are inevitable. How best to deal with cases usually gives the operator much concern. In the past, we have thought of tissue-bearing partial denture construction too much from the mechanical side, rather than from the functional. Each case requires a different mechanical procedure, and the end result is governed by our ability to choose such mechanics as will best restore functional efficiency. In addition, we must educate the patient concerning the difference between this work and fixed dentures. We must explain the various changes that take place after insertion, so that they will cooperate with us in whatever maintenance is necessary to keep the restorations in an harmonious relationship with the rest of the mouth.

We have all constructed too many tissue-bearing restorations without first establishing in the patient's mind a proper understanding of the functional difference between this type of restoration and fixed dentures. Nearly all partial denture patients are familiar with fixed dentures in some form. They expect the same service and efficiency from tissue-bearing restorations that they receive from fixed mechanical dentures on natural teeth. To attempt to conduct such an education successfully after the various changes have taken place, and at a time when the restoration is out of harmony with its surroundings, will only serve to place the operator in a false light.

There is another form of partial denture that is often mistaken for a tissue-bearing restoration but which is essentially tooth bearing. This is the partial denture which has directly attached to one end of the saddle rigid contour cast clasps, without a stress breaker intervening between the clasps and the saddle; or the same type where any form of clasps with an occlusal rest is used as the retaining agent and no provision is made for breaking stress. Let us consider what disposition is

made of the pressure during mastication with this type of case. The direction of the force exerted is naturally toward the tissue. When pressure is applied, the retaining agents prevent any movement of the saddles toward the tissue at the abutment teeth, but permit a somewhat angular movement toward the tissue. In other words, the abutment teeth serving as pivots, the restoration, under the stress of mastication, will describe an arc, with the greatest movement at the ends opposite the abutment. This movement toward the tissue is possible owing to the fact that the free ends of the saddle are resting on compressible mucosa.

The leverage applied on the abutment teeth in these cases is at an angle, and the application of stress on any tooth at an angle to its long axis will produce trauma. The overcompression of mucosa at the free end of the restoration, where only a small saddle area transmits the load to the underlying tissue, will result in reabsorption. Bone will not tolerate excessive pressure without undergoing changes in an effort to relieve that pressure. For reasons just stated, this reabsorption serves to create additional leverage on already overloaded abutment teeth.

Pressure caused by the function of mastication is placed on a denture from many different angles, and when occlusal rests prevent the restoration from moving toward the tissue in harmony with the force applied, the force will, of course, be carried to the abutment teeth. The clinical evidence of harm to the abutment teeth from this type of partial denture may not manifest itself at the time of insertion, but continued function on a mechanism so poorly designed generally results in premature loss of those teeth.

The strictly tooth-bearing partial denture is that type of restoration which transmits the masticating load directly to the abutment teeth. In order that it may do this, clasps or some other removable form of attachment must be placed at each end of the saddle or saddles, as the case may be. In principle, these restorations vary little from fixed bridges, and, generally speaking, the same natural laws that govern fixed bridgework will govern this type of restoration. The load is not carried to the tissue under the saddle any more than it is transmitted to the tissue under our pontics in fixed bridgework.

In certain sections of the United States, this type of construction has considerable popularity, but the mere fact that the work is removable does not alter the principle under which it renders functional aid. When the two types of restorations, i. e., the tooth-bearing removable partial denture and the fixed bridge, are given a comparative analysis, we find that, in the principle of distributing stress, they vary but little. Where indicated, it is not surprising that fixed bridgework, which demands less upkeep after insertion, still holds favor in restoring occlusal continuity to the dental arches.

The work of Box and Anderson of Toronto, with that done by Stillman, McCall, Smith and others in this country, shows conclusively that the application of lateral stress on teeth, that is, stress applied at an angle to the long axis, will produce trauma. Severe traumatic occlusion exists in practically all these cases prior to reconstruction. We are not so much interested in merely making a partial denture as we

are in seeing that the partial denture aids in relieving traumatic occlusion. To do this means that our restorations must be so constructed and maintained that the applied stress is evenly distributed over the entire arches, and that none of the remaining natural teeth receive the applied stress at an angle to their long axis.

The use of the occlusal rest type of clasp directly attached to a tissue-bearing restoration always produces lateral stress on the abutment tooth, with trauma to that tooth, in direct ratio to the amount of change in the alveolar ridge supporting the restoration. True, certain types of spring wire and friction grip clasps may be so constructed as to modify this action; nevertheless, the mechanical principle is not changed, and they still operate to produce lateral stress, and lateral stress is traumatic stress. In other words, when employing spring clasps, we do not end this action, we merely vary the degree.

Analytic study of the functional processes of the masticatory apparatus, and the extent to which these processes have been disturbed owing to the loss of teeth, will, in itself, often suggest the type of mechanics best suited to the case. Many times, our point of view is changed, and mechanics become secondary, being employed merely as a means to treat the existing physiologic deficiency.

It is not the intent of this paper to cover in a detailed way the physiologic deficiency that arises in the mouth and its tributary parts as a result of the breaking down of the dental arches. The physiologic problems that arise following any retrogression in the human dentition are not peculiarly partial denture problems, but are rather problems that bear a more or less common relationship to all types of dental restorations. A knowledge of the physiologic functions of the oral cavity and adjacent parts and the ability to recognize how far-reaching the impairment of these functions may be may well form the future foundation of dentistry. Partial dentures are but means at our command of aiding in the restoration of a certain functional efficiency.

Whatever the nature of the restoration, certain preliminary preparation must be made. This consists in a study of the existing mouth conditions, and education of the patient as to what he may expect from this form of restorative dentistry. No matter how great the technical skill of the operator may be, the patient will fail to appreciate the work unless a careful, simple and direct explanation is made of his individual case and of the general problems that are common to partial denture work. I have had many failures in the past owing to my inability to appreciate this vital point, and today I contend that a general education of the patient as to what the nature of partial denture problems are, and as to what he may expect in his individual case, should be a routine procedure before attempting a restoration.

There is a tendency among us to be too technical when explaining dental problems to our patients. This has been the origin of many a misunderstanding. The patients are very apt to give the impression that they have thoroughly understood everything that we have endeavored to explain, when, in reality, our entire talk has left them with little knowledge. A very good method of determining to what extent our educational talk has been effective is to ask

the patient a few simple related questions. The answers given to these questions will clearly demonstrate that many times we have failed in our purpose. To carry the case through to completion under these circumstances would be to invite failure.

The problems in partial denture work are very different from anything the average patient anticipates. Patients' ideas and knowledge of dentistry are based largely on past experiences, which have generally consisted of operative dentistry in various forms. When made to understand in advance just what can be expected from a partial denture, patients, as a rule, will accept the conditions gracefully. When the educational talk is left until after the insertion of the case, or if the patient has failed to understand our explanation of the problems involved, we generally have a dissatisfied patient. It is impossible at this time to inspire further confidence, and any attempt on the part of the operator to explain conditions, no matter how tactfully done, is usually interpreted as an effort to cover over shortcomings in the construction of the partial denture.

Do not lose sight of the fact that the main object in making partial denture restorations is to aid in reestablishing proper functional efficiency to the broken down masticating apparatus. Train yourself to visualize the problem in its entirety, instead of merely directing attention to some mechanical application that will fill the space. The mechanics should always be secondary to, and dependent on, the existing functional deficiencies. To accomplish our objective, the restorations must be constructed in accord with the natural laws involved.

DISCUSSION

G. E. Cleophas, Beloit, Wis.: In no other type of dental restorative work do we encounter such varied and complex conditions as that in which the mutilated arch demands a partial denture restoration, and we must guard against merely filling this gap with our favorite type of appliance and perpetuating present pathologic conditions and abnormalities. We may have, in this restorative work in the same arch, portions of the masticating force met by well implanted roots carrying only their own load; portions to be met by teeth carrying more than their own load and subject to trauma from some type of attachment, and portions met only by a resilient and compressible mucosa. With our case mounted on an articulating frame, we can construct a fine and balanced piece of work, but when this same piece is placed in the mouth, and functioning, physiologic conditions enter in to such an extent that even the engineering we had so accurately figured, on our firmly supported models, is changed and found to be faulty. I want to lay stress on a few points to consider in these different types of partial dentures mentioned by Dr. Little. The first type is the simplest or tooth-bearing removable case, a case which has its support from the teeth at both ends, and, as was said, has the principle of stress distribution, as in fixed bridgework. The physiologic condition to consider here is the strain on these supporting teeth. We must increase the size of our embrasures and reduce the cusp interdigitation slightly from what is normal, to this mouth, realizing that the abutments carry an overload in exact proportion to the length of the span, one half of which is usually carried by each abutment in addition to its own load. In the second type, the more complex cases, in which we have a tooth at only one end of the span, we should make our appliances tissue bearing, if possible, the tooth being used only to overcome gravity in the maxilla and to aid a little in retention in a mandibular case. There are some cases so short or in which so little ridge or process remains that it is the lesser of two evils to use a tooth-bearing retaining agent on the tooth at the one end. This divides the load between this tooth and the soft tissues. In such cases, three things must be done to minimize the potential physiologic changes: 1. Cover all possible bearing surface with

the saddle. 2. Do not allow too much load, especially on the lever end of the case. Often, an equally good balance and efficiency can be had and maintained by shortening the customary masticating surface. 3. Select an attachment that will not act as an orthodontic appliance on the tooth or exert a force injurious to it. The movement here should be as free as possible from any tooth strain in both compression and release. The third, or tissue-bearing type case, used always where we have a sufficient ridge, should have a tooth attachment that allows for a tissue compression under masticating stress and an immediate and free release by the resilient mucosa on the removal of this stress, thus having a free vertical movement of about 0.5 mm. This pumping movement to the tissues, during mastication, is stimulating and an assistance in circulation, instead of having an opposite effect or strangulation, which causes atrophy. This slight vertical movement, I believe, should be separate from the main retention of the appliance, for stronger retention is usually necessary to keep it in place, or, to repeat, where the same friction is used both for retention and the release from masticating stress, the principle is wrong, as we either have insufficient friction for retention, or too much to obtain easy relief from the masticating stress against the resilient mucosa. There should be a slight free horizontal movement, so the adjacent teeth will be practically relieved from any overload. We have heard exploitation of the standardizing of the various types of dentistry, but this subject on which Dr. Little has written is so complex that we have to compromise and use "common sense" in each individual case to determine which procedure is the lesser evil.

I. L. Furnas, Cleveland, Ohio: This paper, in place of dealing with the problem presented from an engineering point of view as indicated by the title, has clearly set forth and enumerated many of the trials and tribulations which act to make partial denture service a liability instead of an asset in the average dental office. To enumerate these seems to be about all that can be done, because a perfect solution or panacea is not yet, and this fact in itself seems to close the discussion automatically. It has been my custom in the past to draw a sharper line of distinction between partial dentures and fixed and removable bridgework than seems to be the idea of Dr. Little. I should define each of these as follows: A partial denture is a removable prosthetic appliance placed in the mouth as a substitute for and to perform the function of lost natural teeth, the stress of mastication upon which is borne by the underlying tissues. A removable bridge is a removable prosthetic appliance placed in the mouth as a substitute for and to perform the function of lost natural teeth, the stress of mastication upon which is borne by abutments and piers. To me, there appears to be a marked difference between these two appliances. However, they are synonymous in many localities. The term "partial denture" seems to have almost disappeared in some offices where the operator has discovered that a much larger fee can usually be secured for a "removable bridge." The use of stress breakers is strongly recommended in every case where it is advisable to use them. However, it is a regrettable fact that all such appliances at present obtainable are far from what could be desired. The plan outlined by Dr. Little regarding education of the patient is a good one provided it is not overdone. It is perfectly right and just to both patient and operator that a definite understanding regarding the resultant efficiency of the finished restoration be had, provided the operator does not so thoroughly clothe himself with alibis as to feel that he has no further responsibilities after the finished case is delivered.

A PLEA FOR THE PRESERVATION OF NORMAL TISSUE CHARACTERISTICS IN OPERATIONS FOR CLEFTS OF THE SOFT PALATE*

By ALBERT D. DAVIS, B.Sc., D.D.S., M.D., San Francisco, California

THIS paper offers nothing new to the profession in the way of operations or technic but is rather a résumé of a few important steps in technic which have stood the test of time. The keynote is better understanding and service to the patient. Indirectly, it offers a plea for the preservation of normal tissue characteristics following palatoplastic work and attempts to point the way to more uniformly successful results in operations on the soft tissues of the palate. Quotations from Brophy's "Cleft Lip and Palate" have been freely used, and a preacher without a bible could be in no worse predicament than a palatoplastic surgeon without the work of this great master.

Operations for the closure of the soft tissues in cleft palate should be performed in such a way that the tissues are capable of retaining their normal characteristics. Various operations have been devised and modifications have crept in, and the surgeon of today who undertakes the difficult case of closure finds the literature so full of methods and schemes that he is at a loss to know the value of any given operation, unless he has had a great deal of experience in this work. The cleft itself, to the inexperienced surgeon, seems simple enough to warrant an attempt at closure without special armamentarium or training.

Unfortunately for the patient, too often a badly operated cleft palate leaves defects which may never be overcome. The soft tissues, comprising the covering of the hard palate and the velum itself, are thin, flexible and resilient. The soft palate is made up chiefly of small muscles enclosed within, or covered by, mucous membrane continuous with the mucoperiosteum of both the oral and nasal cavities. Rarely is it at rest under normal conditions. It has a wide range of movement and its integrity is essential, not only to voice tone, articulation and vocalization, but also as a buffer for the tongue in forming certain sounds. A complete shutoff between the oral and nasal cavities is necessary to produce the so-called explosives and fricative sounds—K, G, Sh, T, D, etc. This function of the soft palate is rarely fully understood by many surgeons who perform these operations.

Closure of the cleft, without thought of retaining the tissue characteristics and ultimate normal muscular functions, is

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a poor service rendered. Normality should be the goal. All tissues are present in a cleft palate that are present in a normal palate, but they are misplaced and ununited. A thick cicatricial mass of tissue, without function, even though united, is a poor substitute for a flexible, resilient, normal palate which may be reconstructed by proper methods. Lack of understanding of the methods to be employed to obtain this normality

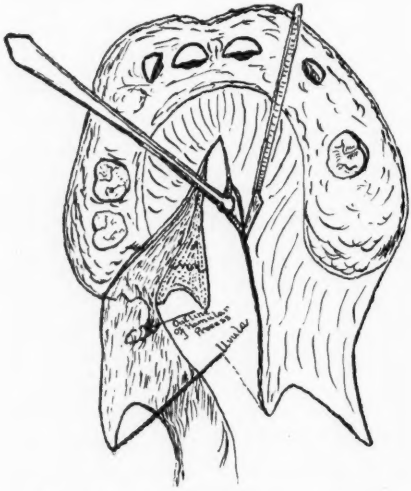

Fig. 1.—Method of freshening the edges of flap. The right side shows the flap elevated as far back as the hamular process of the sphenoid bone.

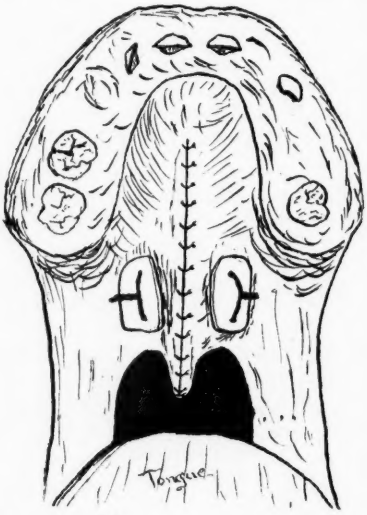

Fig. 2.—Silver wires and lead plates in position to form the splint. The ends of the wires will later be bent down on the plates. Horsehair sutures are used to unite the edges of the cleft.

is the cause of many permanently mutilated palates. Mere closure of the cleft aids materially in restoring a more normal respiratory tract, but unless the palate is long enough and flexible enough to function properly, speech will not be improved to any appreciable extent.

At birth, the muscles and tissues of the normal palate are friable and underdeveloped. As growth proceeds and the child begins to speak, a rapid development occurs, and the central mechanisms of the brain respond accordingly. There is thus established a neuromuscular pathway; which results in normal speech. If, on the other hand, the peripheral mechanism is impaired by a cleft, there results an attempt at normal speech by calling into play other adjacent tissues; e. g., the aryepiglottic folds, the ventricular bands and the epiglottis itself. This gradually develops a response in the central mechanism and establishes an abnormal pathway resulting in a speech defect both centrally and peripherally. The same condition occurs when the end result of a staphylorrhaphy is a short, tense, scarred

palate. Even under long training, the patient rarely attains normal speech. To overcome this difficulty—abnormal neuromuscular pathways—the patient should be operated on just prior to the time he learns to speak, but not until the tissues are well developed.

The factors entering into the formation of a soft palate which retains its tissue characteristics, is long enough to function properly and is free from scars are technically within the reach of every surgeon interested. When complicated by clefts involving the maxillae or the alveolar ridge, the sequence of the operations performed, and the results of these previous operations, determine to some extent the prognosis of the soft tissue operation. If the lip has been closed first, and the traction of the orbicularis oris has been allowed to determine the degree of approximation of the maxillae, a normal, long soft palate cannot be expected.

The bones must be united and held immobile, and the arch must be prevented from spreading by the use of silver wire and lead plates. In other words, to insure normality in the soft tissue operation, a sound foundation must be laid by securing normality in the operation on the hard tissues. This is probably one of the most abused fundamental principles of all cleft palate operations. With the formation of a normal bony arch, the cleft in the soft tissues is narrowed and lengthened, and the ununited parts assume a position which allows of their union without tension or distortion. In addition, it is unnecessary to make lateral incisions in the soft palate in order to approximate the edges of the cleft.

Brophy gives eight reasons why lateral incisions should not be made, and I have yet to learn of a similar number of reasons for using them:

1. Unnecessary hemorrhage.
2. Creation of new fields for infection.
3. Loss of function, due to retraction of cut muscles.
4. Defective hearing by destruction of continuity of the tensor palati muscle.
5. Deprivation of chief source of palatine nutrition by cutting the principal branch of the posterior palatine artery.
6. Muscular atrophy due to destruction of the nerve supply.
7. Unnecessary cicatrization resulting in a thick, clumsy palate.
8. Shortening of the palate rendering correct phonation impossible.

A very common cause of failure in the soft tissue operation is the improper method used in freshening the edges of the flaps. This seems such a minor thing that comment would be hypercritical, yet some surgeons attempt to split these thin edges with an incision parallel to the edge, the knife passing between the fold of mucosa on the edge itself. Later, a double row of sutures, the lower uniting the nasal portion and the upper the oral portion, are placed directly over each other, the lower ones being allowed to slough out or remain in place as Nature sees fit. The theory is to obtain a wide surface contact. Such attempts are rarely so good in practice as in theory. To begin with, the surgeon is dealing with a very thin membrane, freely movable and soft. The edge is at right angles to the line of attack, and even if an angulated knife is used, the tissues curl upon themselves until it is almost an impossibility to make the split directly on the edge as originally planned. In addition, islands of epithelial tissue are often unavoidably left along the edges, which, when sutured, fail to

unite, a defect remaining. It is much better to sacrifice a minimum amount of tissue with a direct through and through incision at right angles to the edge and thus insure a complete freshening throughout the complete length of the edge of the flaps. This freshened surface, if the work is properly done, will be of sufficient width to secure union of the parts with a single row of sutures.

The use of lead plates and silver wires as a splint in operations on the clefts of the soft palate dates back to 1883, when they were designed and first used by Brophy. The spasmodic contraction of the freshly united muscles which are elevated and put on a stretch after being in a more quiescent state renders their use a necessity. Pilot sutures of silk are introduced with a Deschamp's needle about midway between the border of the cleft and the alveolar ridge and are picked up with a tenaculum as the needle is withdrawn. By means of the pilot sutures, silver wires are introduced, followed by lead plates, which are threaded on to the wires like buttons, and bent to conform with the shape of the palate. The wires are twisted and adjusted to the plates in such a way as to form a splint, but not tightly enough to interfere with circulation.

The position occupied by the plates is important. They should render inactive the muscular movements of the soft palate. If properly placed, this splint allows movement of the palate *en masse*, but no movement of one side or the other at different times.

The advantages of the use of this splint are summed up by Brophy as follows:

1. Prevents sutures cutting out, by tension on the soft parts, distributed over a large area.
2. Suspends muscular movement until union occurs.
3. Protects the palate, in that the twisted wires are uncomfortable to the tongue, and in nursing the tongue will not come into contact with the freshened edges and make suction.
4. Renders temporary artificial palates and other devices for protection unnecessary.
5. Allows perfect relaxation of the tissues without the use of lateral incisions.

It must be remembered that the use of the lead plates and silver wires is not for the purpose of exercising force on the tissues so that they may be pulled together. Their main function is to act as a splint, preventing muscular action and the cutting out of the sutures. By their use, the surgeon is able to produce a palate the tissues of which retain their normal characteristics, free from scar, flexible, resilient and long enough to shut off the oropharynx from the nasopharynx so that perfect speech is possible.

209 Post Street.

THE DENTAL HYGIENIST*

By E. MELVILLE QUINBY, M.R.C.S., L.R.C.P., D.M.D., Boston, Massachusetts

THIS paper is intended to be an affirmation of the value of the dental hygienist in modern dental health service. Being firmly convinced that the dental hygienist has a place in this service, I should, under other circumstances, feel it unnecessary to take up your time with such a presentation. My contacts with the dental profession have led me to believe, however, that my views are not shared by all dentists. Since I have had something to do with the education of many of these young women, and have, through that experience, come to know rather intimately what their problems, as well as their possibilities for service, are, I make bold to present their case.

It may be of interest to quote the opinions of a number of men recognized as leaders in the field of preventive dentistry:

It was because the profession did not clean teeth that the dental hygienist has come into existence. (T. P. Hyatt.)

We cannot get along without hygienists, but unfortunately we cannot educate the dental profession to see the need of having more of them in their practice. (H. G. Morton.)

Woman has always been our inspiration and help; and I believe that in this field she can eliminate the objections now existing and become one of the crowning features of the dental profession. (Robin Adair.)

Does the dental hygienist occupy a professional position in society? I believe that she does, and that this position should be enlarged and strengthened by the profession that created it.

Public or private employment as a means of sustaining the professional status of the dental hygienist is a matter of individual opinion.

When the dental hygienist is given a good ethical training in her alma mater, and has in addition to that the higher moral qualities with which women are endowed more than men, and an opportunity for development which district, state, and national meetings offer, we may reasonably expect that her legal and porfessional status will equal, if not surpass that of the dentist in the U. S. A. (G. S. Millberry.)

I have considered the future of the dental hygienist only in connection with the public schools. . . . Thus it seems that the public schools . . . which reach all the children of all the people offer the largest contact with the public. It is safe to say that ninety per centum (90) of all constructive health work for the future will be done through this agency.

From this conception of the interdependence of mouth health and general health . . . the field of the dental hygienist must be two-fold:

First—There is the . . . prophylactic treatment and instruction in the hygiene of the mouth to aid in prevention of dental caries and gingivitis as far as it is possible, by cleanliness and artificial gum stimulation.

Second—There is educational service concerning these laws of general hygiene which promote the development and growth of a normal healthy body.

It is this work that must eventually influ-

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*The papers of Drs. Quinby, Adair, Charters, Spalding and Tishler were presented as a symposium on "Practical Measures Employed and the Management of Cases in Dental Prophylaxis."

ence the coming generation. Only through education can we hope to secure better teeth and a higher degree of immunity to dental disease. (A. C. Fones.)

The question of the status and need for the dental hygienist includes the consideration of all the principles involved in the prevention, cure and alleviation of dental or oral diseases. As you all know, the etiology, pathology and treatment of oral lesions is invested with a certain amount of serious doubt and uncertainty in the minds of many dental practitioners.

Therefore, before we are in a position to say whether the dental hygienist is of value to the community, and to formulate a plan for teaching her, it is obvious that the dental profession must adopt a philosophy of dental practice which is at least intelligent. At present, we are involved in altogether too many profitless arguments as to methods and policies, mostly single track!

For the sake of clearness, then, allow me to outline what appears to me to be a definite program of education—a skeleton or framework to be clothed with reasonable hypotheses and suitable for the training of students.

The metabolism of the human organism has been likened to a chemical laboratory where simple substances in combination with others are transformed into bodies of an entirely different nature. Following a similar turn of thought, we may describe the normal arrangement of teeth and surrounding structures as constituting a machine. Like any other machine, its efficiency depends on certain factors, e.g.: 1. Structural strength and resistance. 2. Alinement of the units of the mechanism to insure a smooth working efficiency. 3. Cleanliness and lubrication of the mechanism.

The structural strength depends on nutrition from the prenatal stage onward through all the subsequent periods of existence. The alinement of parts usually depends on nutrition; the right kind of exercise of teeth as they erupt, and hygiene.

My object in stating these well known facts is to bring out the thought that no one factor is entirely responsible for either health or disease. For instance, you may have a Rolls Royce body on your automobile, but this does not mean that you can successfully use in it a ramshackle engine, even if it is kept oiled and clean. On the other hand, a Rolls Royce engine, complete in every detail, will not function for long unless it is cleaned and oiled. Having adopted this general philosophy as a foundation for our study of dental and oral disease, it becomes a comparatively simple matter for us to establish the place of the dental hygienist in the scheme of prevention.

The average dentist, in discussing the status of the dental hygienist, is handicapped from the start, for the simple reason that the subjects which occupy the major part of the dental hygienist's intensive training during one college year are, or have been in the past, barely touched on in the dental school curriculum. As T. P. Hyatt said at Louisville, "The dental hygienist was created because the dentist did not do that kind of work." Again, speaking of the limitation of the manipulative scope of the dental hygienist: The very large majority of the dental profession are in ignorance as to the training of students in institutions such as Forsyth, Rochester, Columbia and Bridgeport. Why a dental hygienist trained in the intensive manner afore-

said and with a wealth of operative material for practice should not be capable of developing the skill necessary for her work, I cannot see; in fact, my experience with hundreds of dental hygienists proves beyond a shadow of doubt that they can develop the highest degree of operative ability.

In making these statements regarding the capacity of the dental hygienist to acquire adequate technical and manipulative skill, I have in mind, of course, that operation whose performance formed the foundation for their legalization. In the Forsyth Dental Infirmary, we call this odontexesis, or the cleaning of the teeth by scraping, filing and planing. This is an essential part of the general health program as outlined earlier in this paper. I may state most emphatically, and I think without fear of contradiction, that the majority of the American people need periodic cleaning of the teeth. It is beside the point to bring up the fact that southern Italians, Maoris, Filipinos and Esquimos enjoy dental health without odontexesis. They do not furnish a parallel to the American citizen of today. So I repeat that nearly all of the 110,000,000 of United States citizens, do require tooth cleaning, most of them very decidedly so.

The thing that we should do is to train more and more dental hygienists for this important work. But, at the same time, we must not fall into the error of assuming that tooth cleaning is all there is to the preventive program. When we keep that fact clearly in mind, we shall expect no more of the dental hygienist in the prevention of dental disease than she is capable of, or is trained to accomplish.

It has frequently been stated that the principal field of the dental hygienist lies in the care of children's mouths. Cohen states: "It is with the child that the dental hygienist paves the way for permanent good. Her task here is twofold: first, to win over the child so that he will look upon the dental hygienist and in turn the dentist and physician as his friend; and second, through showing the importance of a healthy mouth, to inculcate an understanding of all health habits."

Stimulation of the marginal gingival tissues is another sensible thing. Such stimulation is part of the dental hygienist's training in technic at Forsyth, and has been for some years to my knowledge. Stimulation of the gingivae is carried out by a special use of the toothbrush, as advocated by Paul R. Stillman, or through the agency of the "kuroris" holder and cotton rolls. Massage is the final detail in the scheduled technic employed at Forsyth. But gum massage is looked on as one of the links in the prophylactic and curative chain of treatment acquired by the dental hygienist. We would not venture to assert that stimulation of the gingival areas would do it all.

The question arises as to the most convincing argument in favor of the dental hygienist. It has been suggested to me that the most telling proof of the dental hygienist's usefulness is statistics.

I have spent time in considering ways and means of obtaining the needed figures, but it has occurred to me that, according to my own philosophy of dental etiology and practice, the development of "the oral machine," it would be impossible to obtain statistics of improvement when only one of any three factors is available for statistical research.

CONCLUSION

Periodic cleaning of the teeth is an important part of the program of preventive dentistry for both children and adults among the American population.

Gum massage is an important agency for the building of oral health.

The introduction of the child to dental service should be such as will enlist his cooperation.

All three of these things can be accomplished as well by the dental hygienist as by the dental practitioner, and at less expense to the community.

ORAL PROPHYLAXIS AS PRACTICED—A FAILURE OR SUCCESS?*

By ROBIN ADAIR, B.S., M.D., D.D.S., Atlanta, Georgia

THE time and place suggests the thought for this paper. In this city, the best plan for preventive dentistry was born. In this city lived D. D. Smith. The beginning of oral prophlyaxis was of Dr. Smith. Although many years have elapsed since his death, during which time dentistry has made remarkable strides in all branches, we can truly say that very few new ideas on oral prophylaxis have been evolved which are not covered by the principles advocated by Dr. Smith.

When we compare the picture of the first locomotive with the giant mogul of today, or the original telephone of Bell with the modern instrument, we exclaim, "What a remarkable advance!" When we compare the foot engine with our modern unit, we are glad that we didn't practice in the foot-pedal days. When we insert a carved and polished inlay with ease and comfort to ourselves and the patient, we feel that it is a far cry from the time when hours of arduous and trying labor was required for the work under the blows of the mallet. Such thoughts make it all the more remarkable that, in any branch of dentistry, there has not been, nor is there any necessity for, a change in any single original idea of Smith.

If oral prophylaxis is to stand the test, it must be of the Smith kind. On this rock, the thoughts of this paper are to be erected. Oral prophylaxis has made as great progress as any branch of dentistry. Yet, the thing itself is getting to be an art lost to dentistry. Now what do I mean by such a seeming contradition? Exactly this: Prophylaxis has been of such tremendous import and has given such far-reaching results that the work has spread and expanded until it is almost outside the dental ranks, and is almost as big as our profession itself. Even a new profession has been born to take care of a great school and industrial need. Colleges as well equipped as dental schools, are turning out large classes of dental hygienists to meet the ever-increasing demands for someone to do this work. The effect of this has been a "let go" of the work as far as the dentist himself is concerned, with the result that the Smith kind of oral prophylaxis is rarely known or practiced. Far be it from me to say that the above mentioned condition is not for

*Read before the Section on Periodontia at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

the best at the present time. This is a new and different age for everything. The dental hygienists are conquering the children and grown people where we failed, but some of us will be laid on the shelf with the great dominating idea which has gripped the disciples of Smith that prophylaxis is the greatest thing in dentistry and the best thing which could be done for the patient; that its proper application requires more skill and knowledge of conditions than any other branch, and it should for this reason, be administered by the dentist himself.

Within the last few years, prophylaxis has produced some of the most remarkable chapters in dental history. The original leaders in this work, such men as Smith and Eberole, became so enamored with its results that their enthusiasm was misunderstood by the profession, and they suffered great humiliation just as did the early amalgam and porcelain advocates. Nor is all this ancient history. As late as June 9, 1926, a dentist was tried before the civil court because Illinois does not permit dental hygienists to practice, and was suspended from the local and national dental associations, because his wife, a skilled hygienist of large experience, practiced in her husband's office. In many other states, hundreds of untrained girls are doing this work unmolested and in offices where the dentist knows about or cares little for the cause of prophylaxis. And yet, these men retain their ethical standing. Another interesting factor of prophylaxis history is that it was difficult to get space to present the subject on any program a few years ago, while today it occupies a most prominent part in all meetings.

Is there any wonder, then, that out of this maelstrom of contradictions there should arise grave questions as to the real success of oral prophylaxis? A careful survey of the situation will continue the seeming contradiction by the statement that both sides are right. If we find a dentist with a dirty, stained set of teeth, and the same condition in his wife and children, he knows prophylaxis is a failure. If we find an office where no talk or demonstration on preventive dentistry is given the patients, or the dentist has a hygienist in a corner of his office, just for a side-show, we know that no interest for the subject exists here. If you see a dentist or hygienist who uses a pot of ordinary pumice with a dental engine, you will probably see why prophylaxis is a failure. If you see a dentist or hygienist who fails to teach oral hygiene facts to their patients, you will also view another failure. The question resolves itself thus: Oral prophylaxis, as often practiced, is a complete and miserable failure. This declaration but analyzes the fact that, when properly practiced with a spirit of knowledge and enthusiasm, it is the greatest success of all things yet embodied in our profession. Let us give our attention, on the right side of the question, and present the academic and practical points for consideration.

ENFORCED TREATMENT

The treatment must be "enforced." Even the best adult or child patients will not, of their own accord, ask for or receive these treatments unless urged to do so. Strong argument or personality must see to it that your best patients do come at stated times for treatment.

It is almost conceded that a visit each

thirty days is convenient and efficient. This does not mean that each month the mouth should receive all that a regular treatment calls for. If after several visits, the mouth has been maintained as desired, possibly just an examination with a good spraying will suffice until the next treatment. A skilled eye will generally detect sufficient work for a sitting of twenty or thirty minutes. Then, too, the general average of the thirty-day call will only show about eight treatments, for sickness, absence from the city or other causes will prevent 100 per cent attendance. After trying all the systems for the friendly enforcement of this work, we have found that the index system as used by the telephone company and stores for information or credit rating presents the best solution for the call list. A book or ordinary card index is often the cause of failure to get results. While this installation is costly, it is well worth the money expended.

SYSTEMATIC CHANGE OF ENVIRONMENT

The proper prophylactic treatment must produce a "systematic change of environment of the teeth." To do this, the operator should use all that the dental college teaches, with what has been added by years of experience. A carefully prepared examination and record card is absolutely essential for success, and on this is to be recorded all defects, such as initial cavities, traumatic occlusion, soft spots and irregular wear on certain cusps or one side of the mouth. To this, the roentgen-ray card, which is always of great advantage, may be attached with a clip. It is an unnecessary mental burden, even if it were possible, to carry this information of many patients. At each sitting, at least one of these recorded defects should be eliminated. A question has often been asked as to what we will do when the mouth is at best normal and presumably "perfect." After years of endeavor, we know that this ideal is always to be sought but is seldom achieved. Although many patients have received the regular attention for twenty years, the general average shows that many either move away, die or give up the treatments just when the operator is accomplishing the best results. Grant that a certain number remain on the call list until the chart shows the case "complete:" the ideal work is at hand to keep it so and real prophylaxis can be used. At this ideal stage, the chart can contain a record of "a talk delivered on foods," "information on school work," especially if the patients are children, or "a talk on industrial dentistry," as applied to the several businesses. In these cases, we can extend our work to "perfect sanitation" for all the organs of the mouth. When a patient is seen so often and with such an ideal purpose in mind, it is surprising how many defects of the glands, tongue, uvula or tonsils will show up.

RENEWED SANITATION

"Experience having demonstrated that the most careful and painstaking (patients) are unable, with the agents commonly employed, as tooth brush and dentifrices, tooth picks and dental floss, soaps and so-called germicidal washes, or other agencies, to effect this end, the plan of forcible, frequent, renewed sanitation by an experienced operator has been found indispensable." The word "renewed" should be often repeated and impressed on the mind of

the patient, for it is the accumulated effect of treatment that counts in this work. It is the "regular call" that keeps up the patient's interest and the good habits which may have been taught.

THOROUGH POLISHING—BY HAND METHODS

"In detail, oral prophylaxis consists in most careful and complete removal of all concretions, calcic deposits, semi-solids, bacterial plaques and inspissated secretions and excretions which gather on the surface of the teeth, between them or at the gum margin. This operation should be followed by thorough polishing of the tooth surfaces by hand methods (power polishers should never be used), not alone the more exposed, labial and buccal surfaces, but the lingual, palatal and proximal surfaces, as well, using for this purpose orange wood points in suitable holders, charged with finely ground pumice stone as a polishing material." Those who have witnessed dental students, hygienists or the average dentist, even, cleaning a set of teeth, can realize how they make such a "Comedy of Errors" when attempting the operations just described.

Nature seems to have left almost everything in the rough state for man to develop into its greater beauty by polishing; woods, metals, stone, finger nails and even the teeth. Nature did better by the teeth than anything else. In this work, we like the word "polish." It is commended to you with great zeal. The word bears with it a sense of politeness, delicate beauty and the admiration of the artist for his work. It does not carry with it a call for several ounces of pumice spread over the teeth of the patient. It does not carry with it the idea of a high powered dental engine with big cup-shaped brushes on the hand piece. It does not carry with it the idea of high speed or polishing just the exposed surfaces of the teeth, but rather the sense of a skilled operator who would rather have the bottom of the fissure or a contact point polished than the exposed surfaces of the teeth. In passing, let us take note of the fact that proper polishing not only improves but also actually preserves and helps every object so treated, and as far as the teeth are concerned, no harm is done, but more benefits are derived than from any operation in our work. The agents used for abrasive or polishing are flour pumice and Turkey stone. These can be diluted and perfumed by the addition of tooth paste. The instrument used must be rather large with a heavy handle, the most nearly ideal being the Harrell type which holds the wood points at the best angle and with a firm grip. The wood points are made from a strip of shoe pegs. The prepared points from dental supply houses are both unsuitable and costly. The final polish is best accomplished by the use of a sprinkling of oxid of tin on a small piece of cotton cloth. With a rapid rotary motion, it is surprising how the beauty of the teeth will become more apparent.

THE MOST FAVORABLE CONDITION

"Treated in this manner the teeth are placed in the most favorable condition to prevent and repel septic accumulations and deposits." The verdict of those who have followed the original Smith ideal is that the statement is true. Any failures are due not to commission but to omission.

EFFORTS OF THE PATIENT

"And aid all efforts of the patient in the direction of cleanliness and sanitation." Careful investigation will show that many of the so-called failures of prophylaxis are often due not so much to procedures of instrumentation and polishing; but to the insufficient time or the method used to secure the cooperation of the patient for the home sanitation of the mouth. On the other hand, just as many failures have resulted by overtraining the patient and burdening him with a technic requiring propably ten minutes for performance and too many brushes. It is certainly sane to use the simplest and quickest method. The patient will use it more often and continue it longer. It has been found that almost any brush, hard or soft, large or small, big or little, is satisfactory if one has the proper idea that they are to remove the débris, and does not give so much attention to some special method. By questioning, we sometimes learn that patients who can be regarded as failures gave up because of an extensive technic. Sometimes they say that they kept up the work for a week or a month. These patients can be returned to the fold by being shown that their mouths can be cleaned in a few moments with almost any shaped brush. The Oral Hygiene Committee of the State of New York is to be commended for their stand in avoiding all complications by the use and endorsement of a simple wood-handled toothbrush which can be secured for 6 cents.

CONCLUSION

The endeavor has been made to avoid any effort at learned discourse, new discussion or scientific research, and to present in a plain practical way the reasons why some dentists are not getting results in the work and the way in which the work can be done to gain results. The dentist who does this work properly is like the great artist—the porte-polisher is his brush, the polishing agents, his paint, and the patient, his canvas. His work, when finished, produces a picture more beautiful than paint can produce, with the added value of comfort and health to a human being. Such a result should afford as much satisfaction to the operator as comes to the artist when he finishes his masterpiece and it is ready for the gallery.

The D. D. Smith definition of oral prophylaxis, quoted throughout this discussion, is most heartily and earnestly recommended for your work:

> The treatment consists of enforced radical and systematic change of environment of the teeth and perfect sanitation for all organs of the mouth. Experience having demonstrated that the most careful and painstaking are unable, with the agents commonly employed—as the toothbrush and dentifrice, tooth pick and dental floss, soaps, so-called germicidal washes or other agencies—to effect this end, the plan of forcible, frequently renewed sanitation by an experienced operator has been found indispensable. In detail, oral prophylaxis consists of most careful and complete removal of all concretions, calcic deposits, semisolids, bacterial plaques and inspissated secretions and excretions which gather on the surface of the teeth, between them, or at the gum margins; this operation should be followed by thorough polishing of all tooth surfaces by hand methods (power polishers should never be used), not alone the more exposed labial and buccal surfaces, but the lingual, palatal and proximal surfaces as well, using for this purpose orange wood points in suitable holders, charged with finely ground pumice stone as a polishing material. Treated in this manner the teeth are placed in the most favorable condition to prevent and repel septic accumulations and deposits, and not less to aid all efforts of the patient in the direction of cleanliness and sanitation.

IMMUNIZING BOTH HARD AND SOFT MOUTH TISSUE TO INFECTION BY CORRECT STIMULATION WITH THE TOOTHBRUSH*

By W. J. CHARTERS, D.D.S., Des Moines, Iowa

IN an examination of the employes of several large department stores in Boston, Dr. Emmons of Harvard University found very few persons having clean mouths. The proportion was one to five. His figures referred to clerks in department stores, but the probability is that the figures have a general application.

About half of the people referred to by Dr. Emmons had what he called "fair" mouths. The persons in this group needed to have their teeth cleaned and polished and to have some fillings and extractions. Nearly one-third who had what was called recurring toothache were in the third group.

There was a time when the only way to handle a decayed or defective tooth was to pull it out. Then came the period of filling and repairing. Today, we are in an era of preventive dentistry, when the most important dental procedures are cleaning, and the use of methods planned to produce sound teeth and to save them, rather than to repair them or provide substitutes after irreparable damage. In such preventive work, I believe that we are beginning to appreciate what the toothbrush can do more than we have ever done in the past.

The modern toothbrush may not be perfect, but its present status is a matter of evolution from the "chew stick." One end of a wooden twig was beaten to a soft, fibrous condition in those days, and the primitive brush was ready for use.

The morning ablutions of a native of India are never complete unless the teeth have been cleaned and the mouth thoroughly washed. No food may be eaten until the ceremony is over. However poor the Hindu may be, a bundle of little white sticks is kept on hand and one is withdrawn each day to be used for scrubbing the teeth. Once used it is thrown away, and it is always broken in two before being discarded so that it will not be used by anyone.

Some negroes in an "African village" were observed cleaning their teeth with such an instrument. They carried a small supply of them secreted in some fold of the clothing, and it would seem that they were busy cleaning their teeth when not otherwise employed. Their teeth were beautifully white, and no decided recession of the gums or pyorrhea could be noticed.

This early toothbrush has a number of good points. A positive pressure can be applied, and the fibrous end is so soft that the gum can be given a gentle massage. It is so cheap that it can be used and thrown away, and this is ideal from a sanitary point of view. However, it can be used only with the up-and-down movement and does not get into the interdental spaces and deep

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fissures, and I believe that these places are really the most important of all in preventing diseases of the gums and teeth, the most common ailment of modern man in particular.

Of all the diseases with which mankind is afflicted, the most prevalent are diseases of the gums and teeth.

Pathologic conditions have always, to some extent, been present in the mouth, but unlike many other diseases which have diminished in severity in modern times, mouth conditions, in our time, have been growing steadily worse. It is my opinion that more good can be accomplished by the dentists, in this present age at least, in teaching patients how to clean the oral cavity correctly, than dietitians can possibly accomplish in trying to regulate the diet to such an extent that the toothbrush will not have to be used nor will it be considered a necessity.

One of these two systems must be perfected and results attained, before the people will be relieved of many diseases from which humanity is suffering. It is not my intention to discourage the teaching of proper diet; but it is a much easier task to teach a correct method of brushing the teeth than it is to wean the average person from his taste for jam and French pastry. Therefore, let the dental profession take another step forward, banding together in the great cause of teaching real preventive dentistry, in the sense that the patient will be made to realize the necessity of returning for examination in six months time, and when these patients do return, after faithfully brushing the teeth in the manner, I will show, with the aid of slides, that their mouths will be in practically perfect condition; and we can truly make the statement that they have graduated in the art of mouth hygiene. This is no longer a question but a decided fact.

It has been said that a clean tooth never decays. This sentence was cut too short, in that it should have added "and stimulated gums never show pyorrhea, owing to the fact that pyorrhea and decay do not go hand in hand."

People who are free from tooth decay are led to believe, after reading the phrase, "a clean tooth never decays," that they are free from mouth ills, when, if the truth were known, they are in more serious condition than if they had some decay. One of the most treacherous characteristics of pyorrhea is that in 95 per cent or more of cases, no pain is present, with the result that the first examination reveals an unsuspected and serious condition. The stimulating of the gums that is accomplished with the bristles in ordinary brushing does not have the required effects.

About twelve years ago, I started to work out a method to teach my patients how to keep their mouths cleaner. The reason that first prompted me to work out this theory was that my patients would return in six months or a year with their mouths in as unhealthy a condition as they were when first examined, and my work seemed to be in vain. I procured an artificial set of teeth, a toothbrush and some vaseline, which I colored black, and plastered the interproximal spaces with the colored vaseline. I then attempted to remove it by using the up-and-down motion. In making this test, I proved absolutely to myself that it was impossible to remove the vaseline from between the teeth. Then I tried the next method in

vogue, the big circle, or rotary method, with results that were not so good as in the first test. After studying a short time, the thought came to me that to clean a surface the cleaning instrument must come in contact with that surface. Taking my brush, I pushed the bristles straight in between the teeth and then further in with a small rotary or vibratory motion, and very soon I was convinced that I was obtaining results.

In the last test, I learned that I could stimulate the gums with the sides of the bristles. I also learned that the brush does not remove mucin from the mouth without thorough rinsing.

The next, and most important step, was to try the method. Using my own mouth as the subject, I was immediately convinced, when I pushed the bristles in between my teeth, that my brush had touched parts of my gums that had never felt a bristle before.

While brushing is effective as a cure, its merit is in real prevention, and our patients will have greater respect and confidence in our work when we have taught them that most all teeth surfaces can be cleaned with a toothbrush and that the most of the brushing being done nowadays touches only the high spots, where decay seldom starts. The attention of the patient should be called to the fact that there are five surfaces to every tooth that should be brushed, mesial, distal, occlusal, buccal and lingual. The average person brushes two surfaces, namely, the buccal and lingual, and firmly believes that he has done a perfect job, when in reality he has not even started. The majority of people have learned incorrectly how to brush their teeth through instructions from the platform and toothbrush drills, or by reading toothbrush or tooth paste advertisements.

Removing sensitive conditions arising from exposed roots is easily accomplished by this method of brushing, and this is one of the very difficult conditions we have to contend with. The most sensitive tooth surfaces can be desensitized in a few minutes, and in an hour the same sensitive condition will return and will continue to return after each brushing for a few days; but in three or four weeks, most of the bacteria will have been eliminated, the resistance of the remaining bacteria is on the wane, the acid begins to weaken, and the dentin, which at the start was hypersensitive, is rendered insensitive to the touch of a steel instrument. I have cured many cases with no other instrument than the toothbrush.

I have had cases of muscular rheumatism that have been cured by brushing only, and there are cases on record where eczema has been made to clear up, and many cases of beginning pyorrhea have been eliminated. That tired feeling is, of all other conditions, the easiest handled. I find that cases can be treated effectively in two weeks' time.

Several years ago, Madam Montessori originated a method whereby small children could be taught to feed themselves, sew and in fact do everything mechanically correctly. She has made a wonderful success of this method, and many of her theories are being used in educating the small children today.

Now, if children can be taught to do these things correctly, they can be taught to brush the teeth correctly. And I ask you who say that it is impossible to teach children this method just to give it a fair trial, using normal children for your subjects, and you will

find that, in most cases, they respond and learn the method much more readily than do adults.

Some will perhaps say that they are afraid that this method will cause undue recession of the gums. I have examined the mouths of hundreds of children and have never yet seen such a case.

You cannot drive the tissue from the palm of your hands, or the soles of your feet. Nature cares for this and builds resistance in the tissue to withstand any pressure applied.

The big circle method is half way between the horizontal motion and the up-and-down. The horizontal motion is the more effective than the up-and-down motion, as shown by tests made on artificial teeth.

THE ORTHODONTIC CASE

In orthodontic cases, a more or less mechanical appliance is used. Is it possible to stimulate the gum margin, and clean the teeth under this appliance with the up-and-down or the large circle method?

These children have a fine opportunity to be taught the home care of the teeth as they make many visits to the dental office before their case is completed. If the method that I am presenting is ideal for these mouths, it must be ideal for any other condition, either normal or subnormal.

Every local patient who comes in for pyorrhea treatment is required to take a two weeks course in brushing before cureting is started. A urinalysis is also made at the first sitting, and if trouble is located, the patient is informed of the condition and is told to visit the family physician. The patient is also instructed to bring two toothbrushes to the dental office. One is returned to him for home work, and the other is placed in a large test tube, which is labeled and dated, and is kept in the office for brushing and demonstrating. Appointments are made with the patients for every day, if possible, or at least every other day. The nurse who gives the lessons consumes about ten minutes at brushing and ten minutes in instructing the patients how to manipulate the brush.

The disclosing solution is used to show the patient the surfaces that they may be missing.

THE METHOD

Place the brush at right angles to the long axis of the teeth, the points of the bristles in contact with the surfaces; then gently force the bristles between the teeth, being careful not to pierce the gums, that is, do not allow the points of the bristles to rest on the gums. With the bristles between the teeth, exert as much pressure as possible, giving the brush several slight rotary or vibratory movements, causing the sides of the bristles to come in contract with the gum margin and producing an ideal massage. Be careful not to make this movement sufficient to remove the bristles from between the teeth. After making three or four small circles, remove and replace in the same area. Make three or four applications in the same place. The reason for this is that the points of the bristles strike the labial, buccal and lingual surfaces, then slide into the interproximal spaces. Move the distance of one embrasure and repeat the process, holding the sides of the bristles firmly on the gum margin. The V-shaped spaces between the teeth assist in crowding the sides of

the bristles against the gingivae. Where teeth are missing, we have to depend on our sense of touch to keep the proper pressure, with the sides of the bristles on the gum margin.

Be sure to enter every embrasure from both the outer and inner surface on both the upper and lower teeth. Most of the third molars, which, because of the close proximity of the ramus of the jaw and the soft tissue in that region cannot be approached at right angles, must receive more careful attention, and the brush should be tipped so that the bristle ends reach the outer and inner sides. Third molars in proper alinement and occlusion can be saved as long as any other teeth if they are kept as clean.

Last, but very important, remember do not brush the chewing occlusal or grinding surfaces with a sliding or sweeping motion, but place the brush directly on this surface, then gently force the bristles into the pits and fissures, giving a slight rotary movement. Remove and repeat until the entire chewing or biting surface has been brushed.

When the teeth have been thoroughly brushed according to the method that I have just described, the next important point for consideration is proper rinsing of the mouth. The brush removes very little food accumulation from the mouth. The film, with the aid of the saliva, forms a liquid that fills the fissures and embrasures.

It is important that this so-called accumulation of waste food be washed out of the mouth. After taking a mouth full of water of body temperature, with the teeth and lips occluded the water is forced back and forth through the interproximal spaces with as much pressure as possible. An abundance of water is used for this purpose, the idea being to wash the bacteria out of the mouth, rather than try to destroy them in the mouth by an antiseptic.

THE BRUSH

The brush should be seven eighths inch from the heel to toe and five-sixteenths inch in width, and the bristles one-half inch in length. The tufts should be separated from each other about the width of the tuft. The top of the tufts should be saw shaped. The handle of the brush should be 7½ inches in length and made rigid, preferably of bone. The fine Russian bristles, which we are not able to procure at the present time, are by far the best. We are forced to use a coarse bristle, as this method is hard on the bristles, especially in the hands of the beginner. Many families using this method of brushing their teeth have had one member instructed in a dental office, and on his return home, he has become a teacher for the other members of the family.

Practical demonstrations in the mouths of dentists serve best to make this method clear. Real experience is the best teacher and makes the most lasting impressions. Several lessons will be necessary to teach the proper use of this method. After the first lesson, I am sure that you will be convinced and brought to a realization of the value of this method.

After a few years of uphill work, I organized the Des Moines toothbrush clinic, which has given demonstrations at five national dental conventions, several state and numerous district meetings. If each district dental society would organize a toothbrush

unit, we would be able to reach all the dentists in a comparatively short time. Would it not be worth the effort?

The method is not an experiment. I have been teaching it to my patients for years, and there is no other one thing in my practice that has given me such lasting and genuine satisfaction as the pleasure of having my patients come back year after year with clean teeth, and beautiful pink, hard gums. It is worth more to me than money, and I earnestly advise that you make the teaching of this method to your patients a part of the routine of your practice.

THE FUNDAMENTALS OF DENTAL PROPHYLAXIS*

By GRACE ROGERS SPALDING, D.D.S., F.A.A.P., Birmingham, Michigan

AN exact understanding of the fundamentals of any subject is essential to its accurate application. To this maxim, dental prophylaxis is no exception, and we shall progress further as a result of our deliberations if we can arrive at an agreement concerning the fundamental principles of this branch of dentistry, than by a concurrence on details of technic, nomenclature or the function of the dental hygienist.

All progressive dentists, whether they consciously practice dental prophylaxis or not, will admit, if closely questioned, that it is a vital subject, deserving consideration, although it may not interest them, since they are giving their attention to other departments of dentistry. This would indicate that they consider it a work apart from their individual lines of practice. This attitude is met with frequently, and is unquestionably the result of a restricted understanding of dental prophylaxis, if we assume the term to mean a specific treatment which is used periodically for the prevention of dental caries and periodontal disease.

This treatment was described more than a quarter of a century ago by its founder, the late D. D. Smith, of Philadelphia. As described by him, it consisted in "the forcible and positive change of tooth environment from harmful to beneficial; the thorough removal at frequent and regular intervals of all accumulations, from all exposed surfaces of the teeth, leaving whatever of the tooth may be exposed, thoroughly polished, and thus in the best condition, to favor all efforts of the patient in the direction of cleanliness." He added that "it must be done by educated skillful dentists, enforced and repeated, as a vitiated environment may demand it."

For the benefits of the treatment, Dr. Smith claimed, "the almost complete immunity from decay, even during gestation, depending upon thoroughness and frequency of application; the great improvement in color and

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general appearance of the teeth; the diminished sensitiveness of the dentin; the tightening of many teeth which had become loose; the relief from undue sensitiveness of the gums; their marked adherence to the necks of the teeth; the beautiful color appearing in them; the cleanliness and general comfort of the mouth.

However valuable this treatment has proved to be, it is, nevertheless, not all of dental prophylaxis, although an advantageous part of it. Our understanding of the term has grown until it embraces most of dentistry as it should be practiced. As the latter has developed, we have been able to realize a greater service than restoration, that of preservation. This is dental prophylaxis in its broader meaning, worthy of any dentist's time or study. It is an ambition to be cultivated, not to be delegated.

If a cavity appears and we restore the tooth, applying the principles of correct restoration, have we merely filled a tooth? Have we not practiced dental prophylaxis as well? If a third molar, through its slow eruption or its malposition invites otherwise unpreventable dental caries and periodontal lesions, endangering the health of the approximating tooth, would not the extraction of the third molar be "guarding against disease," and hence, prophylaxis? Is not the successful correction of malocclusion in childhood dental prophylaxis? And thus we might continue to enumerate examples of dental practice which are also dental prophylaxis. We again quote Dr. Smith; "The object of our profession is to prevent disease in the mouth and permanently preserve the human teeth for every service required of them." If we accept this conception of dentistry, we must accept the fundamental that dental prophylaxis is inseparable from dentistry as it should be practiced. Just as long as the members of our profession regard it as a work separate from their interests, in which they are concerned but indirectly, if at all, a task which can easily be delegated to others, just so long will dentistry be operating under a handicap, and fail in its complete service to mankind.

Since the educational feature of any health regimen is of prime importance, it is logical that we consider this fundamental next. Educational effort is of especial value in dental prophylaxis because the extent of its application, as well as its results, is practically unlimited. To establish the permanency of oral health, it is important that dentists and patients appreciate its value. They must have also a true valuation of the human teeth and an interest in their preservation. Patients should be taught the close physiologic relationship existing between all the body cells, in order that they may know that what promotes the health of one group of cells encourages the health of all. No one ought to learn to prize health through the usual agencies of illness or surgery, but by means of education in prophylactic measures, such as rules for correct living and health habits.

Instruction in the personal care of the mouth is a part of this educational work, and must be continued until the lessons are mastered and adopted by the patient as a systematic routine to promote oral health. The method taught is not so important as that it be under-

stood and accurately applied, provided, of course, that it meets two essential requirements. It must first be effectual, cleansing and stimulating to both the teeth and the periodontium. It must secondly be nondestructive to the teeth and the periodontal tissues.

"Cleaning teeth," as such, by the dentist, having in mind as an objective, clean teeth only, is a menial task, unworthy the time of any refined or educated person, and for which there could be no commensurate compensation. However, if the process is a step in the education of the patient in personal mouth hygiene, or in the establishment of oral health, or the treatment of oral disease, or for the sick, it assumes a different aspect, that of a dignified professional service. Repetition of this service is not justifiable after a state of health is once established. Everyone should do this work for himself, and patients ought to be impressed with their own obligations in this matter. Until we recognize these facts, we will always be looking for a way out of the task, being especially enthusiastic about passing the responsibility on to others.

The enlightenment of patients in what constitutes correct dentistry is also a part of this educational factor, which is so necessary to the foundation of dental prophylaxis.

The accurate practice of dentistry demonstrates another fundamental, viz., the inseparability of the teeth from their supporting structures in most any dental consideration of them, in health or disease.

It is at the gingival portion of a tooth that dental caries so frequently begins, and it is here also that periodontal lesions begin; hence, it is of vital importance that this area of the tooth be kept adequately clean. It is of equal importance that the circulation in the teeth and periodontium be kept normal, since it is on this factor that the health of a part largely depends. On account of these facts any successful method of personal mouth hygiene must accomplish the foregoing results.

There is scarcely a single dental operation on a tooth which does not correctly involve thoughtful attention to the periodontium as well. On the other hand, if we maintained a state of health in the periodontium, we might be able to save a large percentage of the teeth that are lost in the mouths of dental patients.

In order to do the greatest good and avert the most evil, in the operative field of dental prophylaxis, we must detect dental caries and periodontal lesions in their incipiency. Because of the technical difficulties, experience and judgment required of the dentist, and the possible danger to life and expense involved for the patient, in treating the results of advanced dental caries and periodontal lesions, it is impractical, unwise and inexpedient not to check these conditions in the beginning, when it can be done with a minimum of effort. Hippocrates, the "father of medicine" living in the fifth century, B. C., wrote, "Diseases must be combated in their origin."

Since there is not one detail which we can overlook, in diagnosis, instruction or technic, if we wish to obtain the gratifying results which lie potentially within our grasp, we must recognize

that thoroughness is a basic element in this application of dentistry. If a patient is incapable of acquiring the technic which is necessary in his individual case for maintaining a state of oral health (and there are many such), the results will be disappointing, regardless of the skill of the dentist. On the other hand, if the operator is not thorough, even though the patient is an adept in personal mouth hygiene, the results will be also unsatisfactory.

It is essential also that there be a thoroughness of understanding of the etiology of dental and periodontal disease. Without this, our work must fall far short of the standards of real prevention. Thoroughness of instruction in oral and general hygiene is indispensable. If the individual dental hygienist is more interested and better qualified to impart knowledge concerning these subjects than the individual dentist, by all means allow her to do so, since thoroughness, a natural teaching ability and a broad training in psychology and hygiene are requisites.

Two complete and intelligent "treatments" each year, accompanied by careful observation and instruction, are of much more value to the patient than twelve indifferent hurried sittings, when the teeth are absent-mindedly polished and incipient lesions often overlooked.

We must not only be thorough, but must also persevere. To be enthusiastic today and indifferent tomorrow results in dissatisfaction and often in condemnation of the work. We must persevere until such a state of health is obtained and maintained as is conducive to the highest efficiency of the dental organs. As guardians of the teeth, we must control conditions.

The final factor, and an indispensable element, is "a consciousness of the truth of prevention." Half-heartedness may obtain, without too much disadvantage, in other dental procedures, but a partial belief is not sufficient in dental prophylaxis. A deep conviction must be lived and applied that there is truth in prevention, and that therein lies as great a service as there is in any other branch of dentistry. It has been said that "there never was a right endeavor but it succeeded." From the success that has attended sincere workers in this field, we can justly assume that dental prophylaxis is a right endeavor. It is through this channel that dentistry is to be brought within the means of the many instead of the few. This will be brought about largely by the educational division and by a recognition and correction of dental and periodontal lesions in their incipiency.

The fundamental character of dental prophylaxis is made up of the following principles: It is inseparable from other branches of dentistry. Education in dental prophylactic measures is of prime importance. An operation on the teeth involves a consideration of the periodontium. The correction of incipient dental and periodontal lesions is essential. Thoroughness is indispensable. Perseverance is a requisite; as is also a consciousness of the truth of prevention in dentistry.

If we can accept these fundamentals, without dissension, our other differences will adjust themselves, and we shall be able to work in unity for the advancement of that through the agency of which our most difficult problems in dentistry will be solved.

THE VARIATION IN CELL RESPONSE TO INJURY OF THE PERIODONTAL TISSUES*

By BENJAMIN TISHLER, D.M.D., Boston, Massachusetts

DENTISTRY, like other scientific professions, has many unsolved biologic problems. Most of those relating to periodontology have a solution common with that of problems in medical practice, especially the one under consideration. This paper has been written for the purpose of describing and discussing, as much as time will permit, the variation in cell response to injury of the periodontal tissues, because the subject is one of the most interesting periodontal problems, and its solution, when realized, will mark an era in the advancement of both health service professions.

When the action of lactic acid on the enamel rods of a tooth has lowered the resistance of the cells therein through calcium disintegration, the proteolytic bacteria ever present in the oral cavity immediately attack the decalcified matrix and caries begins. This is absolute. To attempt to draw a parallel between this phenomenon as it affects tooth structure and that which results in the cells of the periodontium from lowered resistance would be futile, for there is no unvarying response of the cells of these tissues under such a condition. To illustrate this and make the subject clearer, it will be necessary to make use of a typical irritant as a concrete example and to study its effects. Of those which may be mentioned, traumatic occlusion has been chosen because it, in turn, develops an occlusal traumatism which is an important etiologic factor in the development of all forms of periodontoclasia.

When the teeth have been subjected to the action of this force for a period sufficiently long to cause injury, the response of the cells which compose the periodontal tissues is not always constant. Instead there are widely divergent clinical manifestations which vary in kind and intensity, and, in some cases, are entirely absent. Using the gingivae as an example, one of the symptoms commonly observed is chronic gingivitis, and among the most characteristic clinical signs present is a rounded, discolored and detached margin which bleeds readily on being touched. The termination of this condition is often that type of dental periclasia which involves the entire periodontium, an increasing mobility of the tooth and its eventual exfoliation. This condition is often accompanied by the formation of considerable pus. On the other hand, the cell response to traumatic occlusion may be entirely different from that just described as is shown by an atrophy or wasting of the gingivae which results in an eventual exposure of the cementum. The thin edge of the marginal gingiva becomes thickened, but the cemental gingiva remains firmly attached to the cementum and a line of demarcation separates the

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affected from the unaffected area. This condition often terminates as alveoloclasia, the clinical signs of which are marked gingival and alveolar wasting, an increasing amount of root exposure, mobility and an ultimate loss of the tooth. In direct contrast to the termination of chronic gingivitis, pocket formation and pus are absent.

In addition to these reactions, there are others of importance. The gingivae of some patients exhibit a marked difference in the extent of disintegration, even those of late middle age whose occlusal surfaces have been subjected to the effects of a trauma for a period of many years. In some cases, the surfaces are worn so badly that much of the dentin is exposed and the bicuspids and molars lose all semblance of cusp formation; yet there may be little or no change in the gingivae other than a circumscribed atrophy which is the result of passing time.

The foregoing is a brief description of the divergence in cell response to injury as seen clinically; and as the greatest contrast concerns the presence or absence of suppuration, a consideration of the bacterial factor should not be neglected. It is to be regretted that present knowledge is not very satisfactory. Miller,[1] who was the first investigator of any prominence to study this problem, isolated a variety of organisms in the oral cavity. More have been found, from time to time, until, today, the list is a formidable one. We will therefore note the results of some later findings. Kritchevsky and Séguin,[2] lay stress on the hypothesis that all primary lesions of the gingivae are due to a spirochetosis. Kolle,[3] in January, 1917, was the first to advance the theory that suppurative peridontoclasia was a form of spirochetosis, although Miller wrote on this subject in 1884. The California Stomatological Research Group do not agree with the findings of Kritchevsky and Séguin, and their conclusion coincides with that reached by Goadby.[4] Duke, in 1918, gave the names of seven varieties of microorganisms found in superficial areas and six in deep pockets. Benjamin found endamebae present in thirty-five cases of suppurative peridontoclasia and absent in six, and in cases in which the disease was absent, the organisms were present in thirty-four cases and absent in forty-seven.

Hall and Westbay,[5] in July, 1925, gave a report on sporulating anaerobic bacteria found in the saliva, and they conclude that there is no evidence that sporulating anaerobes have any direct pathologic significance in suppurative periodontoclasia. In the following month they made an announcement regarding the frequent occurrence in the saliva of a nonsporulating, gas-forming, obligate anaerobe. Goadby states that, as far as he can ascertain, "no specific organism can be described as the infecting agent." Other investigators, both foreign and American, have pub-

1. Miller, W. D.: Micro-Organisms of the Human Teeth, Philadelphia, S. S. White Dental Mfg. Co., 1890.

2. Kritchevsky, B., and Séguin, P.: The Unity of Spirochetoses of the Mouth, Dent. Cosmos, 66: 511 (May), 622 (June) 1924.

3. Kolle: Med. klin., Jan. 22, 1917.

4. Goadby, Kenneth: Diseases of the Gums, New York, Oxford University Press, 1923.

5. Hall, I. C., and Westbay, C.: Bacterial Factors in Pyorrhea Alveolaris, Dent. Cosmos, 67: 115 (Feb.) 1925. Hall, I. C.: J. Infect. Dis., 37: 87 (July) 1925. Hall, I. C., and Howitt, Beatrice: J. Infect. Dis., 37: 112 (Aug.) 1925.

lished their findings, and since nothing definite is known to the contrary, it may be assumed that the bacteria which have already been identified, while not constant in every mouth, may be regarded as more or less characteristic of all.

I have thus far endeavored to show that, from a single injurious agent (traumatic occlusion), the cell response to injury may be of divergent types, of which the chief difference is that of the presence or absence of suppuration, a phenomenon for which no satisfactory explanation has been offered. We now abruptly face the following condition: Since the chief difference in the cell response is an invasion of suppurative bacteria in one case and a freedom from it in others, is there a definite explanation to account for it?

According to present knowledge, none exists, but research is being carried on by many investigators and the field of study that seems most likely to provide it is that of immunology. Earlier in this discussion, reference was made to the rate of progress and intensity of resulting lesions. Some information which may eventually help to explain these phases of disintegration has been given in a study of the cells designated as macrophages by Metchnikoff and as clasmatocytes by Ranvier and others. These mononuclear cells, which resemble endothelial cells, possess pseudopodial processes and the power of phagocytosis. They are present in connective tissue, but may be found elsewhere in the body. Beckwith and Morrison[6] have identified them in the inflamed gingival areas of suppurative periodontal disease. It is believed that they possess an influence as an immunologic agent, but further investigation will be necessary before a definite statement can be made.

McFarland[7] names four conditions, which he terms "the cardinal conditions of infection," that must be present in order that infection may be made possible. 1. The infecting agent must enter the host in sufficient numbers. 2. It must enter by an appropriate avenue. 3. It must be virulent. 4. The host must be receptive. While all the requisites are important, the last is one which primarily concerns immunity. This condition may be defined as one present in some degree in all members of the animal kingdom, when such members have shown a power to resist the influence of pathogenic germs. It is considered a relative and not a positive term, because of the differences in degree of resistance that exist. Immunity reactions possess two essentials: (*a*) an ability to endure micro-organism products without injury, and (*b*) an ability to destroy microparasites. These conditions are generally recognized by investigators, but when the underlying causes which make them effective are sought, one is compelled to resort to hypotheses and theories none of which have been definitely proved. To quote McFarland: "Unfortunately, the phenomena of infection and immunity are incapable of reduction to general principles, in the present state of knowledge."

The types of immunity are natural and acquired. Natural immunity, which is to be the one stressed in this paper,

6. Beckwith, T. D., and Morrison, L. F.: Occurrence of Clasmatocytes in Oral Conditions Related to Pyorrhea, J.A.D.A., 13: 38 (Jan.) 1926.

7. McFarland, Joseph: Biology, General and Medical, Philadelphia, W. B. Saunders Co., 1920.

is of four varieties: species, race, family and individual (Karsner and Ecker).[8] Of these, the last is of great interest because it deals directly with the variation of cell response to injury. It is known that when numbers of persons are exposed to the same infection, some are entirely unaffected, while others are affected in varying degrees. The influenza epidemic of 1918 was a concrete example of this, because of its world-wide scope. It will be recalled that the resulting symptoms varied from an ordinary grippe cold to insanity and death. On the other hand, numbers escaped infection, and as the divergence of symptoms often occurred among members of a single family, the reason for it cannot be entirely attributed to a temporarily lowered resistance of those most affected, particularly when we consider young children all of whom live under identical conditions.

It is believed that the fluids of the body, more particularly the blood, contain definite antibacterial and antiinfective substances and, in addition, the nonspecific ferments of the body fluids aid in combating infection. The acidity or alkalinity of fluids within the body, as well as certain substances yet unknown, may serve to retard or prevent bacterial invasion. Zinsser[9] states that "In the absence of positive evidence in support of the direct inheritance of this individual immunity, the most reasonable explanation for such differences in resistance seems to be in attributing them to individual variations in metabolism and body chemistry." Karsner and Ecker state that "The immunity may be transferred from parent to offspring, may be a natural immunity or an immunity acquired by the parent." They add that it is probably a true transfer through the germ plasm and that, since the time of Pasteur, it has been known that certain dogs are immune to rabies; that Remlinger found that guinea-pigs may transfer rabies to the fetus; etc.

Reference has already been made to the fact that immunity is a relative term. It is believed that, when persons or animals are immune, it does not follow that it is impossible to induce infection in such persons or animals, but that, under normal conditions, they are not injured by micro-organisms capable of producing injury in others. When some agency or a combination of agencies, may reduce the resistance of the cells and interfere with their metabolic processes, the condition known as infection will often follow. In other words, there is a physiologicochemical disturbance of the cell protoplasm in such cases, which results in a lowered resistance, due to the action of the micro-organisms.

It is known that infection is a condition in which the bacterial toxin forms a chemical combination with the cell content and changes its nature, thereby bringing about disintegration and, often, death. Before this occurs, the bacterial product must possess sufficient power to enter the cell body, a process which concerns the permeability of membranes. Bayliss states:

> Since protoplasm has the properties of a liquid and can also be shown to contain free, uncombined salts, there must be some means by which free diffusion between the cell content or organism and the surrounding medium

8. Karsner, H. T., and Ecker, E. E.: Principles of Immunology, Philadelphia, J. B. Lippincott Co., 1921.

9. Zinsser, Hans: Infection and Resistance, New York, The Macmillan Company, 1923.

is controlled, and there is every reason to suppose that the regulation of the passage of substances between the inside and outside of a cell is affected by means of a film or membrane. The membrane of the cell must allow water to pass freely through it but must hold back dissolved substances. Such a membrane is known as a semi-permeable one.

He observes, also, that the cell membrane is an integral part of the cell system, capable of modification, with changes in the cell contents. In his summary, he states that the cell membrane is a local concentration of constituents of the cell protoplasm, due to their property of lowering surface energy of some kind. Substances present in the external medium, if possessing the same property, may also take part. The properties of membranes, therefore, are not fixed, but are capable of modification according to the chemical processes taking place in the cell; or they may be changed by influences on the outside. The membrane is to be regarded as a part of what we may, for the present, call the living system of the cell. When cells are killed, their semipermeability, as a rule, is converted into complete permeability, although this rule has its exceptions.

This interesting hypothesis illustrates, in a general way, the changes which may occur when bacterial toxins come into contact with the cell body and may be applied to the problem of individual immunity. In cases in which there is lowered resistance, the chemical composition of the cell protoplasm may be such that the presence of certain toxic products will readily lower the surface tension, permeate the membrane, and combine with the cell contents and thereby injure them; whereas, in cases in which the resistance is high, the protoplasm may be chemically different and is capable of resisting this action. There are individuals, unquestionably, whose cell metabolism remains normal until some irritant liberates catabolic agencies responsible for the chemical changes already described. These may vary in rapidity and extent, and it is believed that the intensity and progress of the reaction between toxins and cell protoplasm is directly proportionate to the deficiency of the elements of the latter.

Since the chemical composition of cell protoplasm is of importance, it is not unlikely that a well balanced or deficient diet may influence it. Investigators are able to produce symptoms of suppurative peridontoclasia in some animals at will, through a diet deficiency, but this result cannot be demonstrated in humans as yet. That diet has an influence on the teeth is almost unquestioned, but the difficulties in proving the fact are many. It was supposed, at one time, that the change from a poorly balanced diet to one in which the elements were correctly proportioned was all that was necessary to bring about a balanced metabolism. This idea is not held at present because it is now known that all individuals do not assimilate foods alike; therefore, the chemical reaction between the cell protoplasm and food elements carried to the cell by the lymph and blood is not the same in all persons; and consequently, what would be a suitable diet for one is not so for another. In other words, the surface tension of the cells in which assimilation is good is not the same as that in the cell in which it is not. It is reasonable to suppose that, in the former condition, cell metabolism is well maintained and should bring with it an individual immunity to bacterial

invasion known as a high resistance, provided other correct habits of living are observed and the resistant properties contained in the blood and other body fluids already referred to are present.

There is a factor concerning individual immunity which offers the same problem for medical research workers as the one which is being here considered offers for us. It is known that some persons may be immune to the effects of bacterial toxins of much virulency and not be so to others that are less so. There are factors present, apparently, about which little is known, and which, as yet, are difficult to understand; but it may be possible to approach a conclusion, at least, by an application of the Mendelian law. For the benefit of those who may not be familiar with its principle, it will be briefly outlined:

Mendel, an Austrian botanist, announced, in 1866, that when peas of different species were cross bred, the results of the fertilization were constant. For instance, if the seeds of two varieties of peas, namely yellow and green were used, the first generation would show, for example, four seeds, one of which would be yellow and another green, while the remaining two would show characteristics of both strains. He named the original yellow and green seeds the dominant and recessive types, respectively, and the others the hybrid types. If a hybrid is now crossed with a recessive, 50 per cent of the progeny will be pure recessive and 50 per cent hybrid (combination), but apparently dominant. If one of these hybrids is then crossed with a dominant, all will be apparently dominant, but 50 per cent will be of a pure type and 50 per cent hybrid.

It was thus discovered that certain characters of the peas were traceable from generation to generation, appearing in recognizable form in the normal and in the hybrid. Such characters are, for example, color of flower, size of the plant, quantity of sugar and quantity of starch in the seed. These characters which appear to blend with their opposites in the hybrids of the first generation are found, on examination of the second generation, to have affected a temporary combination which loosens up and begins to separate, so that, with each succeeding generation, a greater number of the offspring revert to the parental types, until after, say, ten generations, scarcely any hybrid organisms remain.[10]

Although the Mendelian law is an accepted scientific fact, no one as yet has been able to explain it, not even Mendel himself, and, in this respect, it resembles the roentgen ray, for which no definition has yet been given. It is possible that an application of this law may furnish us a satisfactory reason for the variance apparent in cell response to injury. In any event, a consideration of its application is replete with possibilities. It is known that suppurative periodontal disease has been a scourge of mankind for thousands of years, and since it is acknowledged that members of a race become immune to the ravages of certain diseases after centuries of contact with them, it is not improbable to assume that some or all of those individuals whose periodontal structures are not affected by suppurative microparasites may possess an inherited immunity. Although it is believed that individual immunity is the result of a physio-

10. Footnote 7, p. 268.

logicochemical balance of the cells concerned, and not to an inherited characteristic, one cannot apply this belief readily to the wide difference in conditions found in our periodontal problems. While it is evident that a lowering of this balance is an important etiologic factor, it would seem that the explanation is not entirely satisfactory when the great numbers of persons are considered who experience all stages of an unbalanced metabolism at some time during life and never become infected.

In November, 1924, Hirszfeld, Hirszfeld and Brokman,[11] of Warsaw, Poland, conducted a series of investigations with the Schick test for the purpose of determining the possibility of distinguishing individuals who contracted diphtheria readily from those who were immune. They found that Mendel's law could be applied in many cases, particularly when considering antibodies or iso-agglutinins, which have been found by Landsteiner in human serum. Dungern and Hirszfeld claimed to have proved "unquestionably" that there are "anti-bodies inherited according to Mendel's law." They state that bad hygienic conditions of the poor who reside in the cities of Poland are responsible for the great numbers that contract the disease (diphtheria) and die before the reproductive age, and add that "the greater percentage of immune individuals need not at all be an expression of the acquired immunity of the generation in question but can depend upon a selection of immune individuals in preceding generations."

They examined fifty families for the purpose of carrying out their experiments, among whom were 105 children, and found that when one parent is immune to diphtheria and the other not "The children with the serological group of a suspected parent are always susceptible, while those which inherit the group of the immune parent are mostly immune although sometimes one is met that is not. The immunity or susceptibility is inherited in correlation with the dominant properties . . . . Every property of blood can be connected with the immunity as well as with the susceptibility of the child in dependence of its being inherited from an immune or susceptible parent." They make the important statement that "susceptibility can appear in children, even when there is none in parents," and conclude their article by suggesting that "more than one generation should be considered before the duration of immunity by acquired immunization is understood."

If it should become possible to apply the Mendelian law to our problems in a similar way, it would help clarify present opinions and beliefs to some extent; yet it will be of no practical advantage because it does not bring out specific underlying causes, a knowledge of which is necessary as an effective aid in combating disease. Although the fulfilment of the statement that is about to be made may seem remote, it may be possible to employ Mendel's law or another method in dental practice, at some future time, as a routine procedure in a physical examination of the young. It is growing more and more apparent that dentistry of the future will be practiced from the preventive standpoint, a condition which would indicate its employment. To be sure, its use depends on the possibility of isolating a

11. Hirszfeld, Hanna; L. Hirszfeld, and Brokman, H.: J. Immunol., 9: 571 (Nov.) 1924.

specific organism as the responsible factor in suppurative periodontal disease, from which an antitoxin could be made. It is realized that success is governed by two possibilities: (1) the proof of the presence of a specific microparasite, and (2) the preparation of an antitoxin. Should the first be realized, the task is not complete, for it is not possible to prepare an antitoxin for all strains of bacteria. Should both possibilities be achieved, it would give us a definite agent with which to prevent infection by means of the administration of a toxin-antitoxin mixture sufficient to raise the low resistance found to be present in an individual, to a point where infection cannot develop. From the number of investigators who are constantly isolating new strains of micro-organisms, one of which may prove to be of a specific variety, the realization of this statement is not so improbable as would appear on first thought.

This covers the subject under consideration in a brief manner and although we are aware of the effects that an irritant such as traumatic occlusion will produce in the periodontal tissues, a definite effort should be made to ascertain the factors responsible for the wide divergence in cell response as seen. This opinion, as well as the theories which have been advanced in this paper have been held for some time. They are presented to you for your consideration, and it is hoped may prove to be a stimulant for further study, since the subject is one that must be thoroughly understood before we will be able to conquer our unsolved periodontal problems.

DISCUSSION

Arthur H. Merritt, New York City: For an understanding of the response to cell injury, as it occurs in the periodontium, it is essential to realize that these injuries are for the most part due to bacterial invasion; that this cell invasion can occur only under conditions of lowered cell resistance; and, lastly, that all other factors which enter into the ensemble are important only as they contribute to further depressing this resistance. If an attempt is made to explain these variations in cell response by any of these subordinate factors, confusion is sure to prevail, for it is only as it is kept clearly in mind that lowered resistance is responsible for them all, and that they will vary as this resistance is raised or lowered, that these variations in cell response will be understood. This attribute of cell resistance, inherent to a greater or less degree in all cells, is defined by Zinsser as "the opposition which living cells offer to bacterial invasion." Both are influenced by the number, virulency and character of the infecting organisms, their path of entry and the conditions under which the struggle is maintained. Normally, the tissues of the mouth are highly resistant to infection. As a rule, it is only as this resistance to bacterial invasion is broken down that disease occurs in the periodontium. Chief among these invading organisms is the streptococcus and staphylococcus. While it cannot be said that suppurative periodontoclasia or any other inflammatory manifestation of disease in the periodontium is caused by these organisms, in the same sense that tuberculosis is caused by the tubercle bacillus, they nevertheless play an exceedingly important rôle in their etiology; and there are those who believe that so-called pyorrhea cannot exist without their presence. This is due to their invasive property, rather than to their specificity, and can occur only under conditions of lowered cell resistance. There are, of course, many factors which tend to break down in the periodontium their resistance to bacterial invasion, such as the relative disuse of teeth, bad hygiene, food impaction, traumatic occlusion, etc., of which lack of vigorous use is probably the root from whence all the others spring. If jaws and teeth could be given the same vigorous use in mastication that was given them by primitive man, they would, in a few generations, probably enjoy relative immunity to

disease. Dr. Tishler refers to traumatic occlusion as an "important etiologic factor in the development of all forms of periodontoclasia," saying that the cell responses to this injury are widely divergent, in one case producing gingivitis leading to suppurative periodontoclasia, and in another to atrophy, without pocket or pus formation. He says further that there is no explanation of this, but he expresses the belief that it may be found in immunology. On this point, there seems to be a very general confusion. The mistake is made in giving such importance to traumatic occlusion. Dr. Tishler, I believe, has fallen into this same error in ascribing to it a causal relationship "in the development of all forms of periodontoclasia." As a matter of fact, traumatic occlusion is primarily a symptom, and rarely, if ever, manifests itself, except under conditions of lowered cell resistance and faulty operative procedures, following which, it doubtless aggravates the course of disease, and further contributes to the lack of normal resistance. The divergent types of cell response referred to by Dr. Tishler, represented on the one hand by gingivitis, and on the other by gingival atrophy, were probably not caused by traumatic occlusion (though it may have been an aggravating factor), but by an antecedent lack of cell resistance, as a result of which the other factors, such as traumatic occlusion, alveolar absorption, bacterial invasion, etc., followed as a natural course of events. Traumatic occlusion has been defined as an abnormal occlusal stress, capable of producing injury to the periodontium. If one were to ask what type of occlusion it is that produces this injury, whether it be straight teeth or irregular teeth, no one could answer; for it could be either. There is no type of occlusion to which one can point and say "That is the occlusotraumatic type." Any set of teeth no matter how perfect the occlusion, may, under conditions of lowered cell vitality and bacterial invasion, develop tooth mobility, and so contribute to the already existing overload. It is not improbable that irregular teeth are more prone to disturbances of this nature than are straight teeth, because irregular teeth do not, other things being equal, function as well as do straight teeth, and their investing tissues are, in consequence, more susceptible to deviations from the normal in cell resistance and therefore more susceptible to occlusal trauma. I believe, therefore, that these variations in cell response will be better understood if it is kept clearly in mind that, as a rule, they are caused not by traumatic occlusion or other subordinate factors, but by bacterial invasion, and that all other factors are important only as they add to the lack of cell resistance which made this invasion possible.

UNILATERAL DEFORMITY OF THE MANDIBLE*

By V. H. KAZANJIAN, D.M.D., M.D., Boston, Massachusetts

REPORT OF CASES

CASE 1.—*History.*—In the spring of 1923, a young woman, aged 23, presented herself at the Surgical Clinic of the Harvard Dental School for treatment of a deformity of the lower jaw. At 4 years of age, she had developed an abscess in a tooth on the right side of the mandible. This abscess had broken externally and discharged pus, and formed a more or less permanent fistula. In her eighth year, an operation was performed, some bone being removed from the mandible. This was followed by another operation when she was 10 years old. As the patient grew older, the mandible became more and more deformed on the right side.

Examination.—The general physical examination was negative. A local examination revealed marked asymmetry of the face. The mandible was pulled over to the right side, and the chin was greatly retracted and underdeveloped. There was a scar and suppurating sinus above the angle of the right jaw. A partial facial paralysis involved the upper branches of the seventh nerve. The teeth were neglected, there being many cavities and broken down roots. The lower posterior teeth on the right side were missing. There was marked irregularity of abnormal character. The central incisors were prominent, while the molars and bicuspids slanted mesially.

The mandible on the left side was fully developed, but the molars and bicuspids, while occluding with the upper ones, pointed bucally instead of lingually, which is the normal slant. The right side of the mandible was abnormally short and underdeveloped; hence, the lower central incisors and the chin were very much retracted. The contour of the face was distorted toward the right, following the position of the underlying bony structure. (Fig. 1.)

The roentgen-ray examination revealed marked asymmetry of the two halves of the mandible. There was a rudimentary third molar incapsulated in a cystic cavity at the lower border of the angle of the jaw. In all probability, this was the cause of the chronic suppuration of years' duration. (Fig. 2.)

Treatment.—Aug. 8, 1923, the patient was admitted to the Massachusetts Eye & Ear Infirmary, and, under local anesthesia, the unerupted third molar and the cystic membrane were removed. The patient made a quick recovery, and the external fistula disappeared. April 4, 1924, the patient was admitted to the same hospital for a second operation. Her general physical condition was greatly improved and she had gained in weight.

Operation for Correction of Deformity.—After a careful study of the case, it was apparent that the deformity was caused by the arrested development of the right side of the mandible in childhood. As the left side grew normally to adult size, the dissymmetry of the two sides gradually brought about secondary changes in the position of the teeth and the shape of the chin.

It seemed that the natural course of treatment would be (1) to elongate the right side of the mandible, and (2) to resort to orthodontic treatment for the readjustment of the teeth.

*Read before the Section on Maxillofacial Surgery and Surgical Prosthesis at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 25, 1926.

April 9, the patient was operated on under general anesthesia. An incision was made inside the mouth along the buccal surface of the right alveolar ridge, the bone being exposed on its outer aspect extending from the ramus to the symphysis. With a surgical saw, a diagonal cut was made through the bone, the anterior segment of which was brought

Fig. 1.—Deformity resulting from underdevelopment of the right side of the mandible.

Fig. 2.—Lower jaw of patient shown in Figure 1.

forward for a distance of 5 cm. and connected with the extreme end of the distal segment with fine wires. The mucous mem-

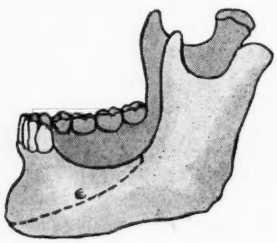


Fig. 3.—Line of incision through body of the mandible.

brane was sutured with horsehair to cover the exposed bone, but the twisted ends of the wire were allowed to protrude through

the mucous membrane into the oral cavity. The upper and lower jaws were immobilized by means of splints previously made for this purpose. (Figs. 3-5.)

Outcome.—No unusual reaction resulted from this operation, the patient recovering quickly. The wire sutures were removed about one month after the operation, but the jaws were left immobolized for more than three months.

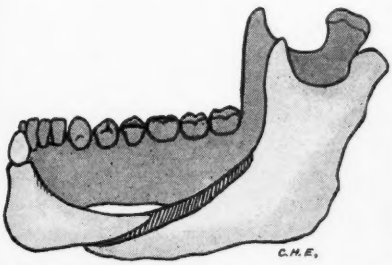


Fig. 4.—Method used in elongating body of mandible.

At the time of the operation, there was little hope that the frail ends of the bone would have enough vitality to regenerate and unite; therefore, transplantation of bone was a later part of the plan. Fortunately, this was not necessary, as after a lapse of a few months, there was complete consolidation of the bone.

Fig. 5.—Wire sutures in position, with splints immobilizing upper and lower jaws.

Fig. 6.—Patient shown in Figure 1, after treatment.

This operation brought the chin forward to the median line and gave a normal contour to the face, but the benefit of the operation was not realized until the patient received

orthodontic treatment. This work was done by Dr. Figichera of the Orthodontia Clinic at the Harvard Dental School. The upper central incisors were pushed backward, and the right upper bicuspids and molars, which were decidedly bent mesially and out of contour with the lower teeth after the operation, were gradually brought out until fair occlusion was gained. In the meantime precautions were taken to hold the lower jaw in the new position by means of intermaxillary elastics. The photograph shown in Figure 6 was taken in 1926.

Fig. 7.—Deformity of the mandible (Case 2).

Before entering into the discussion of possible etiologic factors in deformities of this type, with suggestions for its preventive treatment, I shall outline another case showing similar distortion of the face, which was treated along the same general lines.

CASE 2.—*History.*—Miss M, aged 23, applied for treatment, Feb. 12, 1926, for deformity of the lower jaw.

The past history was negative except that, at the age of 10, in Italy, where she was born, she had an earache and swelling on the right side of the jaw. No deformity was noticed at first, but as she grew older, her face gradually became distorted and the chin retracted to the right side.

Fig. 8.—Wire sutures and splint after cutting and sliding the mandible forward.

Examination.—The general physical condition was negative. The local examination revealed identically the same type of deformity as that in Case 1, with retracted chin, a shortened and poorly developed right half of the lower jaw, and typical irregularities of the teeth and maxillary arches. There was no ankylosis of the jaw or any abnormal changes of the temperomaxillary joints. (Fig. 7.)

Operation.—An operation was performed, February 12, under general anesthesia. In this case also, the right half of the mandible was divided diagonally; the proximal ends of the segments were sutured together with brass wire, as seen in Figure 8, and the jaws were immobilized by connecting the upper and lower jaws.

After the operation, extensive cellulitis developed under the floor of the mouth, necessitating the performance of a secondary operation six days later. In this operation, wide incisions were made on the right side of the floor of the mouth and under the chin, allowing free drainage.

Outcome.—The patient made slow but continuous progress. She was discharged from the hospital, March 23, with the wound still draining freely. Both wires connecting the ends of the bone and the splints were removed March 31. Two months after the operation, the external fistula healed after a small piece of necrotic bone was removed from the wound.

On the last examination, July 25, the jaw had already consolidated. The deformity had greatly decreased, and the chin had assumed a more forward position in the median line. (Fig. 9.)

Fig. 9.—Patient shown in Figure 7, after operation.

COMMENT

While the main purpose of this paper is to describe the surgical treatment of this particular type of deformity of the mandible, one can hardly stop here without going into the factors responsible for this condition.

According to the histories, both patients developed normally up to the age of 4 and 7, respectively. At that age, they suffered acute infection of the lower jaw, followed by a long period of illness. The children developed normally otherwise, but the affected side of the mandible in each case failed to grow in the same proportion as the corresponding half. As a result, a

gradual distortion of the teeth and facial contour took place. The possible explanation of this may be found by studying the physiologic as well as the pathologic factors that stimulate or retard the growth of bone. Many factors which we know little about may influence the growth and development of the jaw. It would seem evident that the following points demand consideration.

1. There is close relationship between the development of the mandible from childhood to adult life and the growth and eruption of the teeth. As the tooth buds grow larger, they seem to act as a direct stimulant to the osteoblasts to build osseous tissue and prepare a foundation for the teeth.

2. Stimulus for bony growth is also gained from pressure applied during mastication, as every time the upper and lower teeth come in contact, the force is transmitted, not only to the jaw bones, but also to the cranial and thoracic bones.

3. The muscles of mastication, being attached to the mandible, affect the growth of the lower jaw in proportion to their exercising power.

4. From the pathologic side, there is clinical evidence that various diseases will retard the development of the mandible. Among these are diseases affecting the growth and eruption of the permanent teeth in a child, extensive necrosis, causing massive destruction of bone, fractures with great distortion of fragments, and diseases resulting in ankylosis of the mandible.

Unilateral deformities similar to the cases outlined above are undoubtedly caused by extensive osteomyelitis of the jaw followed by massive loss of bone, including the buds of the permanent teeth, which normally act as a stimulus to bone growth.

It seems to me that, in order to prevent such deformities, one must assume a conservative and rational attitude in treating osteomyelitis of the mandible in children. In this respect, all possible effort should be made to preserve unerupted and not fully developed teeth. This calls for conservative methods in the treatment of osteomyelitis. Blair and Brown, following the findings of Loeb, have come to the conclusion that, even in the presence of widespread suppuration and bone destruction, the teeth enclosed in their crypts show remarkable resistance to infection, and, if undisturbed, these teeth will, in time, survive and function. Indeed, it is a safe procedure in the treatment of osteomyelitis to establish free drainage for the evacuation of pus, watching the patient carefully, and interfering surgically when satisfied that the sequestrum is completely separated from the surrounding tissues, since nothing is gained by hasty operations.

Pathologic factors are not uncommon in diseases involving extensive destruction of bone. If the jaw is not held in good alinement with a splint, deformity is most likely to follow. In fact, it is good practice to delay the removal of sequestrum until one is assured that there is a sufficient regeneration of new bone to keep the continuity of the jaw. If adequate drainage is established,

the retention of this sequestrum temporarily will act as a splint and will not interfere with the process of repair.

I have had a number of cases under observation for which, in addition to treatment in the acute stages along the lines outlined above, I have constructed splints and orthodontic appliances that the patient may utilize the force of mastication to stimulate bone growth and hold the mandible in proper position.

While it is rather early to draw definite conclusions from these measures, as the cases are still under observation, so far the results are encouraging.

SOME SIMPLIFIED AND EFFICIENT APPLIANCES*

By LLOYD S. LOURIE, D.D.S., Chicago, Illinois

FOUR appliances will be shown. All are for the comparatively simple, yet very important purpose of expanding deciduous dental arches to provide room for erupting incisors. They were selected with the idea that this is a convention of general practitioners, as well as orthodontists, and that this is a phase of orthodontia in which the general practitioner could do much good, and with comparative

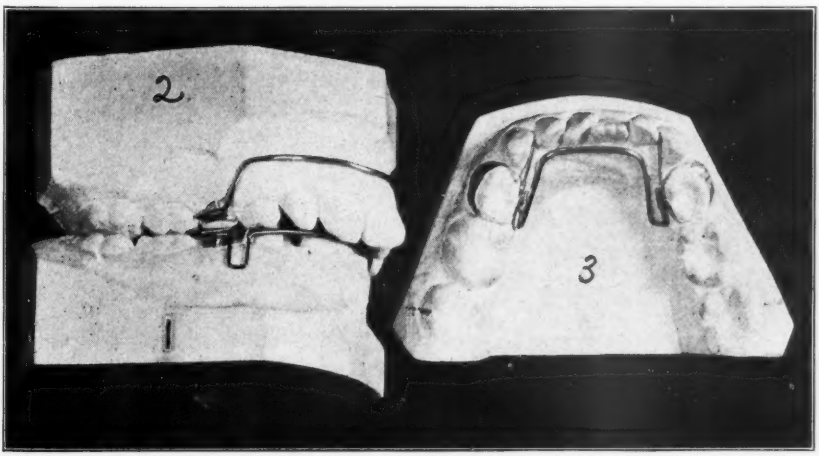


Fig. 1.—Appliance attached to deciduous molars.

*Read before the Section on Orthodontia at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

safety, if using appliances attached to deciduous teeth only. (Fig. 1.)

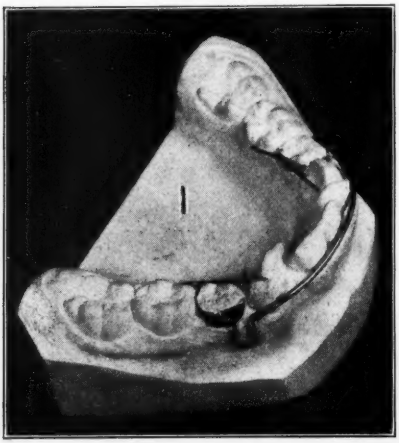


Fig. 2.—Lower labial appliance.

The first three are spring appliances, basically the same, but modified according to the positions in which they are to be used, though any one of them may

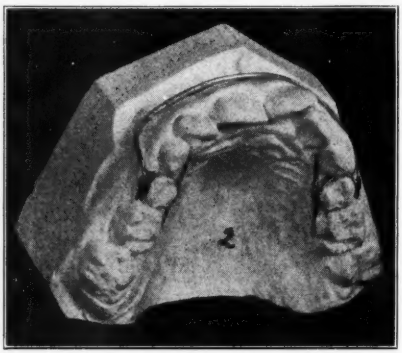


Fig. 3.—Upper labial appliance.

be used for upper or lower teeth. All have spring ends, partly vertical, on center sections which are larger and comparatively rigid. This is important, as spring end compression for application of expanding force should not displace or change the form of the center section, as is the case when wire of the same diameter is used for the whole appliance. Also rotation of anchor teeth is avoided, for the ends which enter the tubes are kept more nearly in the same plane during movement, as displacement or distortion under pres-

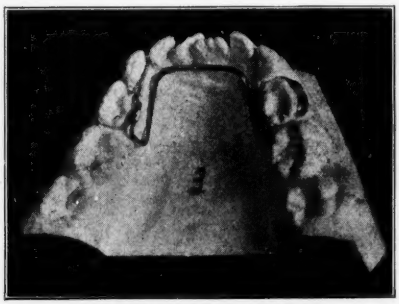


Fig. 4.—Lingual extension from anchor bands.

sure is largely in the vertical portions of the springs. The rigid center also makes it easier to keep the spring ends away from the soft tissues.

In the lower labial appliance (Fig. 2), the ends are 24 gage (0.02 inch) platinum-gold spring wire, and the center sections are of 19 gage (0.03 inch) iridioplatinum. In the upper labial and lower lingual appliances (Fig. 3), the ends are of 22 gage (0.025 inch) and the center section the same as in the lower labial. In all three appliances, the removable portion is locked in place by slight bending of

the ends extending through the tubes on the anchor bands. The ends of the lower lingual appliance are recurved and enter the tubes from the distal side. Lingual extensions from the anchor bands transmit pressure to the cuspids and the other deciduous molars, while additional springs may be added to the removable portion in order to direct the incisors. (Fig. 4.)

The fourth appliance, the "ligature-jack," I described several years ago[1] but it is included here because it has proved simple and efficient, not only for expanding deciduous arches but at the same time breaking finger and tongue habits which cause malocclusion of the incisors, as in the case shown in Figure 5. Ordinarily, it would be adjusted to interfere as little as possible with the tongue, but, in such cases as this, it is purposely placed to prevent protrusion of the tongue, or finger sucking. Lateral expansion is obtained through extension of the telescoping slotted tube and bar, by contraction of silk orthodontic ligatures tied between

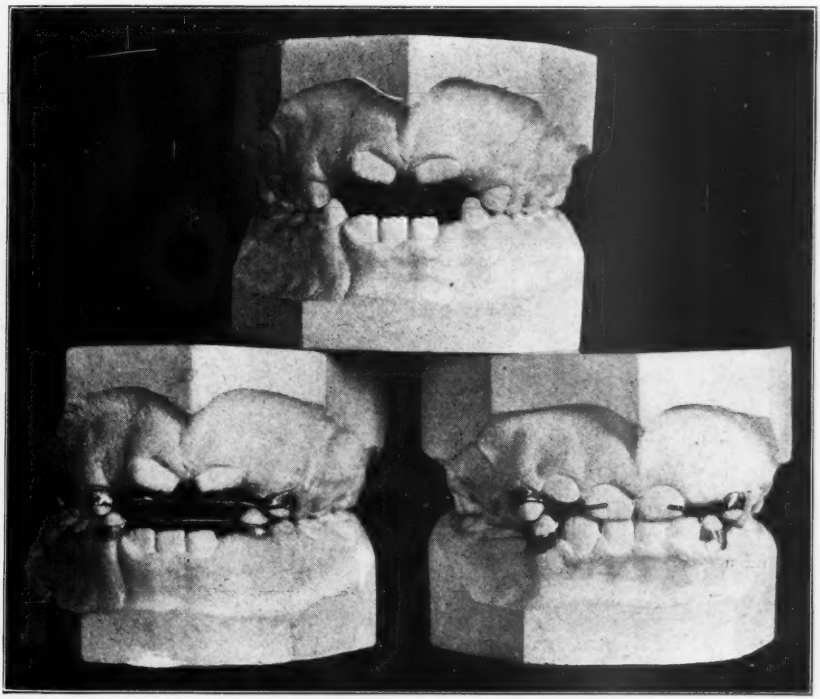


Fig. 5.—The "ligature jack" for expanding deciduous arches and breaking finger and tongue habits.

1. Lourie, L. S.: Internat. J. Orthodontia.

hooks on the telescoping parts. (Fig. 6.) As patient or parent can replace the ligatures at regular intervals, frequent attention by the operator is not required for expansion. Spring extensions may be added for directing erupting incisors, as shown. In this case, the incisors erupted without mechanical assistance, after preventing pressure of finger and tongue.

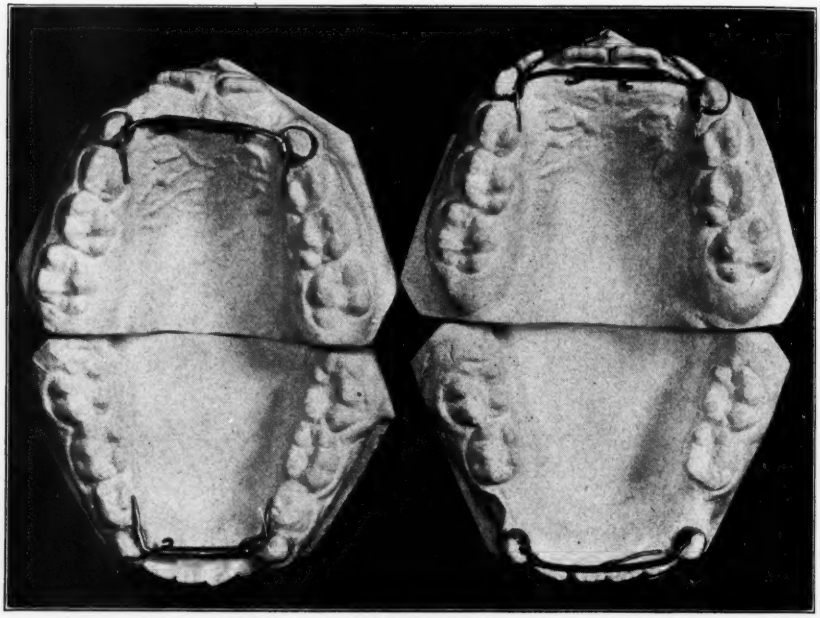


Fig. 6.—Models showing extension of telescoping slotted tube and bar to obtain lateral expansion.

PREVENTIVE DENTISTRY*

By WALLACE SECCOMBE, D.D.S., Toronto, Canada

PREVENTION is the foundation upon which is built the superstructure of modern public health organization, and this fundamental fact applies to dentistry as it does to every other department of public health.

The prevention of dental disease is of vital concern. No disease afflicting the civilized world is more prevalent, and few diseases are more far-reaching in their effect on health, comfort and appearance. And notwithstanding this, many members of the dental profession continue to think entirely in terms of the replacement of lost tooth tissue, with little regard to the instruction of patients in the relation of the teeth to the other parts of the body, the influence of life-habits on the oral cavity or the hygienic care of the gums and teeth.

No dentist can avoid questions of prevention. Whether engaged in public service or private practice, we are constantly brought face to face with the problem.

Sir James Mackenzie has referred to questions propounded, consciously or unconsciously, by almost every patient:

First: "What is the matter with me?" This is diagnosis.

Second: "Can you put me right, and when?" This concerns treatment and prognosis.

Third: "How and why did I get it?" This raises causation.

Fourth: "How can I avoid it in future?" This is prevention.

These are questions every patient asks in some form or other. The sound and considered answer to them is the duty of the practitioner.

The importance of public health education cannot be overstressed. We must educate the people in dentistry, but what shall we tell them? How shall we answer the patient who says, "My teeth constantly decay but my neighbors do not. Why?" Is that not a perfectly fair question for a patient to ask, expecting a frank and scientific reply? Or the frequent query, "Why in the same mouth is one tooth or surface affected with disease and not another?" Such questions can be answered intelligently only when the dentist himself has a clear idea of the etiology of dental diseases. Disease is never a simple matter. Many factors are involved, and in most cases these present an extremely baffling problem.

The ultimate solution of the problem of the prevention of disease is a strong healthy body, functioning in health because of proper habits of living, and with nature's forces of immunity at their optimum. Under present-day conditions, we are living far below such a plane of perfection from both the hereditary and the environmental standpoint.

*Read before the Section on Operative Dentistry at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

Appreciating, then, the seriousness of dental diseases and their incidence under modern habits of living, every dental office should be constituted as a community center for dental health education and service. Such a program, of necessity, involves the problems of prevention as well as those of cure.

We may feel that our community is deficient in knowledge of the care of the mouth. The source of that knowledge is the dentist and the stream cannot rise higher than its source. We must occupy high ground and be the inspiration for dental health education. The degree of "doctor" originally meant "teacher;" the Standard Dictionary refers to the doctorate degree as "evidence of learning and ability to teach." Every dentist, in order to fill his place, must be not only a practitioner but also a teacher. While in the dental office, the average patient is dentally receptive, on many occasions introducing dental topics of conversation, and this is a most opportune time for educational work, including actual demonstration of the correct use of floss, toothbrush and mouthwash. But the average practitioner spends 95 per cent of his time on reparative operations. In other words, the average dentist spends only three minutes in the hour on prevention and education.

Sir George Newman, in this year's annual oration of the Hunterian Society, expressed the ideal of medicine to be "prevention to defeat disease and lengthen man's days." Might it not be said with equal truth of the modern dentist, that, taking Nature for his guide, learning her secrets and being obedient to her laws, he instructs and serves his patients in prevention, in order that dental disease may be defeated, giving to the people longer and happier days with greater capacity for efficient service.

While laboratory experimentation and research has made a most worthy contribution to the progress of dentistry, in the final analysis it is the practitioner having opportunity for studying actual conditions in the mouth of his patient who is in the best position to serve. It was Johnson who said, "Human experience which is constantly contradicting theory is the great test of truth." The remarkable development of specialism resulting from growth in knowledge of dental health and disease does not relieve the general practitioner of his responsibility. In spite of all changes, the general practitioner remains, and there is an ever-growing recognition of his importance and effectiveness.

Many practitioners having to face the established fact of focal infection feel the ever-increasing burden of professional duty. In addition to this obligation to his patient and to his confrère, the modern dentist must bear his share of responsibility for the health of his community. But the burden of this increased responsibility in the modern practice of dentistry is offset for those who practice prevention through the pleasure exeprienced in the periodical return of their patients with good results of earlier preventive service apparent in the mouth. The plan of regular examination results in the observance of the beginnings of disease, when conditions may be more correctly diagnosed, and when certainly they are more responsive to treatment.

In the practice of preventive dentistry, the three following principles are vitally important: 1. Early and ac-

curate diagnosis. 2. Application of physiology to clinical practice. By dental physiology we mean the healthy functioning of the human mouth including the dietary studies and salivary stasis. 3. The use of the dental autopsy to check diagnosis and treatment.

We need more postmortems in dentistry. After extraction, teeth should be studied in the laboratory in order that we may determine how far the diagnosis in each case was correct. It is in these directions that the facilities of universities and departments of health should be used by the members of the dental profession. The faculties of dentistry, in particular, should lead in these important research problems. The profession looks to the colleges for guidance and leadership. In the interest of public health, and the advancement of dental science and practice, dental departments, with their better clinical and laboratory facilities, are expected to make a definite contribution to the solution of these difficult problems, cooperating with practitioners who may have a wealth of clinical material but are without scientific laboratory facilities. On the other hand, laboratories without the wide clinical experiences of the practitioner are of limited value. The hope of the future rests largely with the general practitioner and his willingness to cooperate with the laboratory worker.

Members of the dental profession are frequently at wide variance in the diagnosis of radiograms, even when a complete clinical history is available. In many of these cases, it is of much value to examine the extracted tooth "postmortem" and compare the radiogram and clinical history with the histopathologic report of the laboratory. Such case histories would prove of great value to the entire profession, and lead to more accuracy in diagnosis.

The mechanical conception of the dentistry of a generation ago is rapidly giving way to a biologic conception. A physiologic concept in the practice of dentistry leads not only to a consideration of prevention, but also to more skilful treatment when such is required. The physiologic point of view includes a recognition of all factors involving mechanical or physical disturbance. The prenatal and developmental period, as well as the local environmental factors following the eruption of the teeth; anatomic defects including fissures as well as defects in occlusion, articulation and contact; salivary stasis, the character and content of the saliva, and its relation to food, all are important. The habits of living, and especially diet and mastication, are essential factors in the consideration of susceptibility and immunity to dental disease.

CONCLUSION

I appeal for sympathetic cooperation with school dental officers and in the treatment of deciduous teeth. Frequently, practitioners fail to appreciate the difficulties under which a school dental officer works, and at times create a lack of confidence in the school officer by minimizing the importance of the proper care and treatment of the first teeth, or making some careless remark regarding the school dentist's examination. The same sympathetic attitude is urged toward industrial, hospital or other public dental clinics as being essential in preventive dentistry.

All branches of the service must cooperate loyally with one another if the public is to be lead to a proper appreciation of the value of the teeth and, in

the whole plan of prevention, there is no more important place than that occupied by the general practitioner. Is he playing his part?

DISCUSSION

J. G. Hildebrand, Iowa City, Iowa: If we are to succeed in making preventive dentistry a fact and not simply a name, we must educate not alone the public but also the dentist and the physician that dental caries is a disease, but one largely preventable. There is no denying the fact that both the dental and the medical profession as a body have been slow to inform themselves of the possibilities of prevention in dental diseases. This is not a problem for a few dentists to solve. It is the responsibility of every one who has to do with health matters, be he dentist, physician, nurse, teacher or layman. "It is the unconsciousness of health which clouds people's vision of the necessity of doing those things which will maintain health." There seems to be prevalent in the minds of a majority of the profession the belief that preventive dentistry is a new phase of dentistry. It is new only to those who have failed to interest themselves in this phase of the subject. True there have been many new data brought out by such men as Drs. Seccombe, Howe, Grieves and McCollum, Mellanby and others on the building of sound teeth by correct diet, but the idea of preserving in health the teeth and their surrounding tissues is many generations old. Let me quote from a book written by John Hunter in the seventeenth century. "The importance of the teeth is such that they deserve our utmost attention as well with respect to the preservation of themselves as instruments useful to the body, but also on account of other parts with which they are connected; for diseases of the teeth are apt to produce diseases of neighboring parts frequently of serious consequences." Surely we make progress slowly. None but those who refuse to believe will deny the seriousness of the ever-increasing tendency to dental disease. For many years, we have attacked this problem from the reparative and replacement angle while the preventive end has been neglected. Modern dentistry has seemingly reached the peak of reparative and restorative technic. The profession deserves much credit for the things accomplished and for the comfort given. We shall always need the highest art in this field of endeavor, but the time has surely come when we must lay more stress on prevention. Acknowledging then the seriousness of dental diseases, how may we hope to improve conditions. No great battle was ever won without a carefully thought out, definite and concrete plan of action, capable leaders and a loyal army of fighters well equipped. If we would win, we must subscribe to such a plan. Too many generals and too few privates will surely spell defeat. Why could we not have a leader in this most worthy cause—one big and broad enough to gather together the best and most approved methods of preventing dental diseases? Give us a concise and compact textbook outlining the best methods for the dentist in practice to follow, telling in a simple way how and why dental diseases have increased and how they may be prevented. The dentist might then inform himself so that he could make a correct explanation in reply to the many questions asked him by his patients. The misinformation handed out on simple matters relating to dental problems is inexcusable. Might we not have lecture forms to be given to schools, associations and clubs; textbooks for our schools; more comprehensive courses for nurses in training; teachers attending normal training schools; public health nurses; medical students; a much more elaborate department of preventive dentistry in our dental colleges; publicity of the right sort by competent editors such as that made possible for the American Medical Association through the publication of *Hygeia*? Impossible, you say? Not if we each did our part. As Dr. Seccombe said "The stream can rise no higher than its source." If we fail to inform ourselves that we may become teachers in our offices and communities, we are derelict in our duty to humanity. We are "leaners not lifters." Admitting our shortcomings and our failure to do all that we as a profession might do in making preventive dentistry more effective, it is equally true that the public must assume some of the responsibility. History shows us that as nations become rich and live in luxury, they decline physically. But let us fight on and as general practitioners make preventive dentistry a vital phase of our daily practice.

THE CONTROL AND TREATMENT OF PYORRHEA BY SUBGINGIVAL SURGERY*

By RUSSELL W. BUNTING, D.D.S., Ann Arbor, Michigan

IN the treatment of pyorrhea, it is often said that the disease cannot be cured but may be prolonged. This somewhat facetious statement is significant in that it reveals the disappointment which has been experienced by many dentists in their attempts to treat the disease and the conviction on their part that it cannot be permanently arrested.

As we look back through the history of dental practice, we see that, from time to time, various remedies and methods of treatment have been suggested which have been heralded as specific cures of pyorrhea, and which have been enthusiastically adopted by large numbers of the profession; but the results obtained have not been so favorable as the practitioner has been led to expect. Thus, during the experience of an average dental practice, he may have tried this and that remedy, only to meet with partial success or complete failure, so that it is not to be wondered at that so many practitioners are discouraged concerning the control of this affection, the treatment of which, for them, so frequently ends in failure.

During all of the years in which the several theories concerning the cause and treatment of pyorrhea have been discussed, a certain group of operators have been successfully treating and controlling pyorrhea by local operative procedures. New theories came and went, but these pyorrhea workers have continued in the even tenor of their ways to cleanse surgically the affected root surfaces, to remove all irritants, to relieve stresses and to establish permanent mouth cleanliness, by means of which procedures they secured an arrest of the destructive process and a healing of the lesions in the large percentage of cases. In order to inform myself of the value of such a form of treatment, a number of years ago, I visited several well known specialists in this field and inspected their cases in various stages of treatment. What I saw at that time convinced me beyond question of a doubt that thorough prophylactic and hygienic procedures rationally applied exert a direct controlling effect on peridental disease, and, in many instances, result in a permanent cure of the process and a healing of the lesions. Since that time, I have personally applied these methods of treatment to cases in private practice and in the clinic of the dental college, and from this experience and observation, extending over a period of fifteen years, I have arrived at the

*Read at the Midwinter Clinic of the Chicago Dental Society, Jan. 27, 1927.

opinion that pyorrhea is definitely a preventable disease, and that the great majority of cases which are not hopelessly affected may be stopped, the lesions healed and the disease permanently controlled by a simple and rational form of treatment.

As we review the various forms of treatment that have been suggested, we find that they fall into two general classes: (1) therapeutic measures and (2) surgical, or operative procedures. Notable among the first group are the various forms of amebicides, the spirocheticides, autogenous or stock vaccines and antiseptics, the employment of which is founded on the supposition that pyorrhea is distinctly an infective process. The several remedies have been advocated because of their specific action against various types of organisms which have been believed to be the most active causative factor in the disease. It has been my observation that the use of such therapeutic agents, unless accompanied by certain surgical procedures, gives little more than temporary relief to the pathologic condition.

It is a matter of common observation that, no matter what the underlying cause of pyorrhea may be, there are certain local conditions which must be corrected if it is expected that the tissues will return to health. These conditions consist of certain mechanical and infective stresses such as accumulations of calculi, both extragingival and subgingival; the presence of imperfectly fitted fillings, crowns, etc; the impaction of food; excessive occlusal stress and, in the pyorrheal lesion, the presence of the remains of necrotic hard and soft tissues and the accumulation of infectious materials which are usually found there.

It seems reasonable that, in the treatment of these peridental lesions, we should be guided by the same general procedures which are followed in the treatment of similar lesions in other parts of the body, namely, the removal of all dead tissue, the relief of all local irritations, infective or traumatic, and the institution, as far as is possible, of physiologic rest. In the rational treatment of pyorrhea, it is likewise necessary to reduce all local stresses both mechanical and infective and to afford the affected tissues every possible aid to recovery. To this end, various surgical methods have been suggested, among which is the Robitzech operation, first described in 1862, which consists of an excision of the affected gum tissues by a horizontal line incision at a level of the necrosed alveolar process. This was then followed by a thorough curettement of the bone and root surfaces thus exposed.

More recently, Zentler described a method of laying back flaps of gum tissue over the roots of the teeth affected, curetting the diseased area and subsequently suturing the flaps over the site of operation. In this manner, the affected roots and alveolar process are so exposed that the removal of all subgingival calculi and the curettage of the alveolar bone is greatly facilitated. The subsequent healing of cases so treated is usually attended by the formation of large amounts of scar tissue about the teeth and the permanent loss of more or less gum tissue, depending

on the extent and severity of the disease. Consequently, the cervical portion of the roots of the teeth are permanently denuded and the root surfaces thus exposed often become extremely sensitive to thermal and chemical stimuli.

Although such surgical amputations may effect an arrest of the peridental disease and cause healing of the stumps of the remaining tissues, the results obtained by this method are by no means ideal. In most instances, the possibility of regeneration of the lost peridental tissues to their normal position on the tooth is wholly precluded, and the resultant permanent disfigurement and loss of protective structure about the teeth often make the termination of such treatment of doubtful benefit to the patient.

These radical surgical methods of treating pyorrhea have recently been revived and have come into prominence in dental literature and clinical teaching. To one who has, for many years, observed the results obtained by the employment of more conservative measures in the treatment of this disease, the adoption of such radical surgical procedures, with their attendant mutilations, is tantamount to a confession on the part of these operators and writers of their inability to obtain results by less heroic methods. It is possible to treat peridental lesions surgically without the excision or removal of any of the overlying gum tissue.

In the great majority of cases which are presented, the extraneous deposits and bacterial débris can be removed, the root surfaces which are involved by the lesion can be curetted to remove the subgingival calculi and dead peridental membrane and the spicules of necrotic alveolar bone can be smoothed by subgingival surgery. At the same time, the infective detritus is greatly reduced by these mechanical procedures, and the lesion is cleansed of all foreign and necrotic matter which it may contain. If this procedure is thoroughly performed and the lesion is subsequently kept clean from secondary deposits which may enter in from day to day, the disease will be stopped, and, when the general tissue reactions are good, granulation tissue with proliferation of the fibroblasts will gradually effect a healing of the lesion and a reattachment of the soft tissues to the affected root surfaces.

Considerable skepticism has been voiced by a number of writers concerning the possibility of a reattachment of the soft tissues about a pyorrheal pocket to the "pus-soaked cementum" of the root. Many of these writers have emphatically stated their unqualified opinion that this has never occurred and that it is impossible of accomplishment. The actual histologic proof that healing of this order has taken place in a pyorrheal pocket is difficult to obtain, as patients are unwilling to part with a tooth that has been successfully treated. H. R. Box, in his "Studies in Periodontal Pathology," shows microscopic sections of a root and peridental tissues at the site of a healed pyorrheal pocket in which reattachment of tissues is apparent. Clinically, there is abundance of evidence to convince any fair-minded and unprejudiced observer. Personally, we have seen cases without number, under our own care and in the hands of many others, in which deep pockets freely exuding pus and extending two thirds and even three quarters of the length of the root, in response to operative measures gradually became

more shallow, filling in at the bottom day by day until the tissues were fully attached up to the free edge of the gum margin, save a gingival crevice of normal depth. It is argued by the oppositionists that this is not a true attachment, but merely a close coaptation of the hard and soft tissues without a physical union. To this, we may reply that, in cases in which healing has taken place, if an exploration is made with a smooth nerve broach in a gingival crevice at a point where a pyorrheal lesion previously existed, no entrance can be effected, and if pressure is exerted, blood flows and the patient winces from pain. There is, indeed, no example to be found in any other part of the body in which the hard and soft tissues have so closely coaptated without physical union.

Furthermore, in case of implanted porcelain roots, we see excellent examples of coaptation of tissues without physical union; but, in all of these, an instrument may be readily passed between the tooth and soft tissues at any point. We recognize the fact that this perfect healing of pyorrheal lesions may not always be obtained, since, in many cases, it is not possible to prepare completely all affected root surfaces, and the vitality of the surrounding tissues may be so low that regeneration does not take place; but we know that, when conditions are favorable and the operative procedures have been completely performed, a physical reattachment of the soft tissues to the root to obliterate the pyorrheal pocket does take place in a large percentage of cases. When, by severe involvement, the interproximal gum tissues and the buccal and lingual contours have been considerably deflected, it must not be expected that these tissues will regenerate along the root, crownwise, to assume their old positions, except in young individuals when the recuperative power is high. As a rule, all that may be obtained is a healing of these tissues and an attachment to the roots of the teeth at their present position. Indeed, during the treatment, the gums may shrink down about the teeth to a lower level on the roots because of a reduction of swellings and circulatory disturbances in the submucosa.

It will be recognized that the greatest success in the treatment of pyorrhea is to be obtained in the early stages of the disease. At this time the destruction has not been severe and if the remedial measures are properly applied the disease may be checked promptly and the tissues restored to approximate normality. Could all cases of pyorrhea be treated in their incipient stages the handling of this disease would be a simple matter, but when the process has advanced to the point where deep lesions have appeared in the peridental tissues and the alveolar bone has degenerated, the treatment is much more complicated and the chances of success greatly reduced. In the treatment of these more advanced cases care should be taken not to attempt the impossible. When the general health and bodily resistance are low or indications of severe general infections are present, all seriously affected teeth should be extracted at the outset. Seldom is it advisable to attempt treatment of lesions which extend more than two-thirds of the distance to the apex of the root. Treatment is also ill-advised when the tooth moves up and down in its socket or may be rotated by pressure. So also, when by roentgenographic evidence it is determined that there is not sufficient bone remaining about the apex of the root to support the tooth, successful treatment cannot be hoped for except in very young and favorable individuals.[1]

The treatment of pyorrhea by subgingival surgery is a very simple pro-

1. Bunting, R. W., in Ward, M. L.: Operative Dentistry, Philadelphia: Lea & Febiger, Ed. 6, 1926.

cedure—so simple that the average student in the dental clinic can perform it and thereby obtain a high degree of success in the cure of the disease. Surely, the average practitioner can do as well. The chief consideration is not in the particular selection of instruments to be used, nor any specific method of their application, but rather it is in the thoroughness by which the hygienic measures are carried out and the persistence in the subsequent care of the case until the tissues are healed.

I have found that the greatest success is obtained by treating active cases daily, by devoting not more than from twenty to thirty minutes at each sitting. This daily treatment is continued until the case is under control, after which the patient is seen at intervals of increasing length, depending on the progress of the case and the ability of the patient to keep the mouth clean.

The objective of such treatments is the establishment of oral hygiene in its fullest sense, and the cleansing of the lesions of all foreign or irritating agencies which are unfavorable to their healing. To this end, all extraneous deposits are removed from the teeth and rough or irritating fillings and crowns are smoothed. The subgingival lesions are then cleansed by instruments that are adapted to that purpose, of which there is a sufficiently large range to meet the individual preferences of the operator.

A great deal can be accomplished by the use of a simple and limited set of instruments. The lesions are treated tooth by tooth, the operator beginning at one position of the mouth and proceeding in an orderly fashion, treating not more than one quarter of the mouth at a sitting, and often but three or four teeth. The root surfaces are curetted until they are freed from all calculi and dead peridental membrane and are made perfectly smooth. The pockets are then irrigated with either acriflavin, metaphen, weak iodin solution or a hypertonic salt solution. At subsequent treatments, the pockets which have been previously operated on should be explored carefully in order to remove any fresh deposits of calculus, or food débris which may have entered in since the previous treatment. These accumulations often occur within twenty-four hours, and, unless removed, will continue the irritation just as effectively as the former deposits did; but if the pockets are cleansed each day until the inflammatory changes have disappeared from the surrounding tissues, the tendency to secondary deposits eventually will cease and the tissues will hug tightly the neck of the tooth, preventing the ingress of food materials.

As a result of such treatment, there will be an immediate reaction on the part of the surrounding tissues, attended by subsidence of inflammatory disturbances and a proliferation of new granulation tissue about the lesion, provided the general health and vital reactions of the individual are good. Thus, as the operator proceeds about the mouth, a progressive disappearance of the clinical evidences of peridental disease is noted, and the tone of the gingival and subgingival tissues is greatly improved, as is indicated by an active contraction of these tissues about the necks of the teeth.

All this follows as a direct result of the relief of the tissues from certain local mechanical and infective stresses to which they have been subjected and

a stimulation and improvement of the local blood vascular circulation. As a further aid in the treatment of such conditions, undue occlusal stresses should be relieved; by which, as far as is possible, physiologic rest may be obtained for the teeth. This does not mean that the affected teeth should be promiscuously ground so that they are taken out of occlusion, but rather that any very prominent occlusal planes which show marked lateral stresses in occlusion should be rounded over so as to allow free lateral movement without alteration of the occlusal relationships.

Thus, by all possible means, the hygiene of the mouth is improved, the localized stresses which have been harmful to the local tissues are removed and the affected parts are stimulated to regenerative reactions. When this has been done, the patient should be taught to care for the mouth so as to maintain the improved hygiene and to stimulate the peridental tissues to a healthy circulatory activity. The actual time that is consumed in caring for such cases is much less than might be expected from the description, and when the operative procedures have been carried out in a definite, well ordered manner, the affected tissues, as a rule, show rapid progress toward recovery. It is important for the first week, or until such a time as the case is under control, that the patient be seen daily in order to reduce by fractional sterilization, as it were, any overgrowths of proteolytic organisms which may be active and to discover and remove any secondary accumulations which may have been laid down in the lesions.

When the evidences of inflammation have disappeared and the tissues have readapted themselves about the teeth, the patient may be seen at increasing intervals, depending upon his ability to keep the mouth clean and free from subsequent accumulations and deposits.

The results to be obtained from such treatments are often exceedingly gratifying, in that healing takes place at the normal level about the cingulum of the tooth, or at a position very near that line. Often marked regenerations of tissue promptly appear, especially in the proximal areas and may continue to grow over a period of a year or more until all the lost tissues have been fully replaced. Thus, during the course of active treatment, the evidences of pathologic disturbances and progressive destruction of tissues disappear, and the affected tissues show plain evidences of regeneration until the normal or near normal relationships are established. The results so obtained I have observed to be permanent over a period of fifteen or more years.

Pyorrhea, therefore, is a curable disease when treated according to rational measures of surgical hygienic procedures similar to those which would be employed in the treatment of like conditions in any other part of the body. Radical surgical amputations are unnecessary in those cases which are not so far advanced as to be hopeless. The reliance on drugs or therapeutic measures as a major part of the treatment is almost certain to result in failure. The greatest good can be accomplished by the detection and correction of pyorrheic tendencies in their incipiency.

The establishment of oral hygiene conditions in the early stages of the disease, before the peridental tissues have been seriously involved, constitutes the most effective means of controlling pyorrhea alveolaris.

In conclusion, we would repeat that the chief consideration in successful treatment of peridental disease is the thoroughness with which rational corrective and hygienic measures are applied and the subsequent supervision of such cases until the tissues have healed and normal physiologic relationships have been established.

DISCUSSION

Grace Rogers Spalding, Birmingham, Mich.: I shall consider minor points of difference in opinion, and they must of necessity be minor, since fundamentally I agree entirely with the principles set forth in the paper just presented. It would appear that one of the greatest needs in dentistry is the *open mind.* If open-mindedness had been the attitude in the earlier days of dentistry, there would have been no occasion for this discussion today. In 1882, John M. Riggs presented a paper before the Southern Dental Association, a paper which in a very condensed form duplicates the ideas presented by Dr. Bunting. The report of this paper published in the *Dental Cosmos,* 1882, (p. 527) includes the following: "Practitioners should watch the teeth of the young people under their care and see that the mouth is kept scrupulously clean and healthy. The reason the profession is not familiar with this disease is they fail to recognize it until it reaches its 3″ or 4″ stages and then they treat it by depletion and therapeutic remedies. Some treat it by stippling in acids underneath the gum, thinking thereby to dissolve away not only the tartar but the necrosed bone. Another writer takes off patches of the diseased tissue and another a strip of gum from wisdom tooth to wisdom tooth. This treatment is simply barbarous. The treatment of this disease is purely surgical. Any therapeutic treatment is to alleviate the pain and soreness immediately after the operation. In the *first* stages of the disease, all the treatment necessary is to remove tartar thoroughly, and polish the surfaces of the teeth." That was written nearly 50 years ago, and we are still discussing it. Dr. Bunting speaks of sometimes determining the fate of a pyorrheic tooth by roentgenographic evidence. In my experience, the roentgenogram is in this, as in other phases of dental diagnosis and prognosis, merely an aid. So much depends on the angle of exposure, resistance of the patient, occlusion and the quality of the remaining bone structure (quality is frequently of more importance than the quality) that, in a prognosis, too much dependence must not be placed on the reading of the roentgenogram. Until we adopt a more accurate and uniform method of taking roentgenograms, correct interpretation is uncertain. Dr. Bunting tells us that the treatment of pyorrhea by subgingival surgery is "a very simple procedure." In the early stages, unqualifiedly, *yes,* but later, owing to the shifting relationships of the teeth, and innumerable accompanying complications, much skill and judgment is required for accuracy in diagnosis, prognosis and proper treatment. It then is dependent on the highest type of minute surgery, requiring a delicately trained sense of touch. Without the latter and also well selected and adapted instruments, the injustice to the patient approximates that of the more radical gingivoectomy if uncalled for. We must also not forget the fact called to our attention by Harold K. Box, that the thickness of the cementum in certain areas approximates that of the diameter of an average hair. This demands the utmost skill for conservation of this protecting structure to the dentin. A more agreeable and satisfying form of treatment in my hands than the one described by Dr. Bunting may be outlined as follows: The field is prepared first for a surgical operation. Deposits of all kinds are removed from the exposed surfaces of the teeth, great care being taken not to lacerate the gingivae. The teeth are thoroughly polished and the mouth is sprayed. This results in a wholesome removal of infectious material, which will reduce the inflammation and please the patient. From this first treatment, we can have the assistance and cooperation of the patient and can check up on his ability to carry out our instructions in the personal care of the mouth. We shall have also the advantage of operating in a safer, more agreeable field, with infection materially reduced. Before operating in pockets, any pus is most carefully forced out by pressure and the pockets are washed out several times, which again prepares the field for surgery. The hemorrhage from the pocket will tend to carry away many of the remaining bacteria, and a

blood clot is left undisturbed to fill the pocket. The advantages of this method are: great reduction in the time element involved in treating these cases; more rapid healing owing to the quicker reduction of infection about the tissues, and greater comfort for the patient.

Austin F. James, Chicago, Ill.: I can never think of pyorrhea alveolaris as a disease, but rather as a local infection. There can be no infection without the presence of bacteria, which, in small numbers, are harmless. It is only when growing in masses that they can attack the tissue cells. If the dentist does what every other case of sanitation requires, gets rid of the places that harbor bacteria, he is accomplishing the thing that will solve our problem. Definite technic in instrumentation on all exposed tooth and root surfaces will accomplish this result. Dr. Bunting suggests that instrumentation in the treatment of pyorrhea is not complicated; which is true, if the student is taught some definite technic. Overinstrumentation on root surfaces does more harm than good. I am not advocating the use of dull instruments, but sharp, keen cutting instruments without the trained touch can do serious damage. It may not be possible to remove all calcareous deposits and procure a smooth cemental surface with dull instruments, but enough can be accomplished that subsequent efforts will complete their removal and better results be obtained than by overzealous use of sharp instruments. Nature has provided building-up cells which make possible the regeneration of alveolar process and the filling in of pockets. But conditions sometimes prevent this result. I see enough cases in which the filling in has taken place to know that it can and does happen in favorable cases which come into my hands when in the early stage of inflammation or with the first pericemental abscess. When the chronic stage has been reached, with extended, wide open pockets, this result is not so readily obtained. Mouth secretions and the possible impaction of food prevent Nature doing what she might do without this interference. The foregoing does not mean that I think pyorrhea cannot be cured. I believe the contrary; but in cases in which reattachment does not take place, we must resort to some method of causing the gum to recede to a point where it will have bone support, in this way obliterating the pocket. I do not believe in cutting away the overlying gums, but think that they can be made to recede by proper stimulation from the toothbrush and the building up of tissue cell resistance.

THE ESSENTIALS IN AVOIDING TRAUMA TO CLASPED TEETH WITH PARTIAL DENTURE APPLIANCES, INCLUDING A FORM OF HAND-MADE JOINT*

By S. H. McAFEE, D.D.S., New Orleans, Louisiana

AN exhaustive consideration of all the essentials in avoiding trauma to clasped teeth with partial denture appliances would probably end at the beginning of a circle.

Figure 1 shows an actual case, a class rather frequently seen.

We will accept that the remaining teeth are too good to remove or lose; that the patient's health is too good to warrant endangering any pulps or inviting periodontoclasia, and that both the patient and his teeth are too valuable to jeopardize by an ill-advised or badly engineered appliance intended to supply teeth already lost.

Nothing, that is, no appliance, together with the masticatory handicap, unbalanced occlusion, etc., would, on the whole, perhaps be so disastrous, especially if there is to be a full maxillary artificial denture.

On the right side (Fig. 1), there is not enough usable area of ridge to sustain mastication. Some form of tooth-supported appliance would seem imperative, because a small saddle supported only by the ridge will soon dig in, cause pain and quickly settle out of occlusion if called on to carry any masticatory load. This is more or less true of all saddle appliances supported by mucosa and ridge alone; particularly so with those supported by a limited area. On the opposite side, the teeth back of the first bicuspid are missing; therefore, any successful form of appliance must be supported by the mucosa and the ridge.

In such a case (Fig. 1), the right side of the appliance may be tooth-supported; for example, a Nesbett bridge, or its equivalent, to which a lingual bar may be rigidly connected, the other end of which is also rigidly or immovably connected with the saddle for the left side. A lugged cast-clasp is placed on the left bicuspid and joined to the appliance by some form of movable joint, trauma eliminator or whatever you wish to call it.

This joint should provide for all movements allowed by the resiliency of the mucosa under the force of mastication, but the tooth, clasp and joint should otherwise help to stabilize the appliance as much as possible without trauma to the clasped tooth.

*Read before the Section on Partial Denture Prosthesis at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 25, 1926.

Figure 2 illustrates an appliance made for the case shown in Figure 1, and seated on a duplicate cast. It is a practical appliance now in use.

Figure 3 is intended to show vertical movement. The lines across, over the clasp, indicate the amount of possible vertical movement of the left side of the appliance only.

Figure 4 is another view of the same appliance, showing mobility of the clasp out of the mouth. Only a part of these possible movements occur in the mouth.

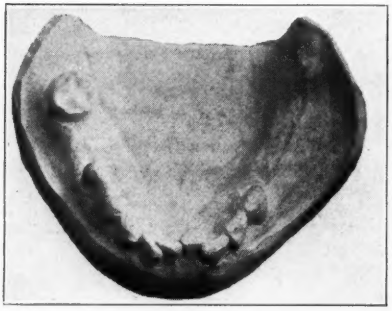


Fig. 1.—Model of type of case frequently seen.

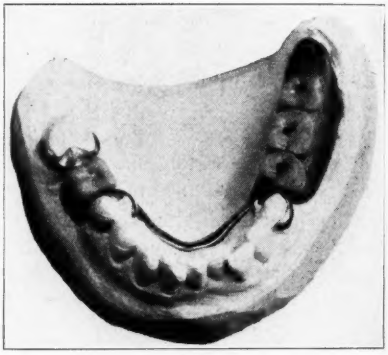


Fig. 2.—Appliance made for the case shown in Figure 1.

No claim is made here for originality of principle or theory or application and I apologize if I duplicate anything which has been previously said or done. Many devices of a similar nature have been made, used, patented, abandoned, forgotten, buried and revived again. This is intended as an effort toward improvement.

However, I venture to state several desirable, if not essential, features which joints or attachments intended for this purpose should provide, and perhaps some points I suggest may make such things seem more practical of construction and use, and stimulate an interest in them.

1. To best meet varying conditions, the joint should be constructionally practical for the dentist, or technician—in an ample range of dimensions.

2. It should allow various relations of clasps and appliance if it is to avoid trauma of the clasped teeth, not only while the appliance is in use but also in its insertion and removal, and yet provide as much stability of the appliance as is safely possible.

3. It should occupy as little of the valuable tooth space in the appliance as is commensurate with other essentials.

4. It should be strong enough to withstand legitimate use, and some of the abuse sure to come, sooner or later, from a large proportion of patients.

5. It should provide a liberal amount of free motion ridgewise to allow for immediate mucosa resiliency, and, later, resorption, without receiving any of the load of mastication, and be able to

withstand the load for a reasonable time if inadvertently or negligently allowed to carry it.

6. Obviously, it should be as simple of construction and technic of application as practicable, without sacrifice of other essentials. It should permit the sooner-or-later desirable, and eventually essential, rebasing of the ridge supported saddle.

7. It should not interfere with free

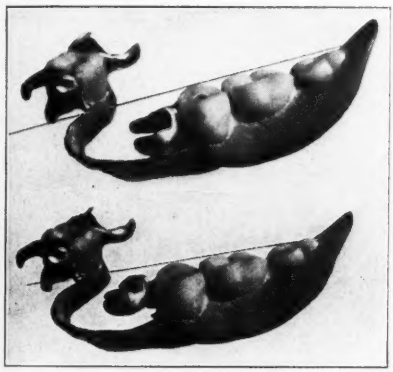


Fig. 3.—Appliances with lines showing vertical movement possible (left side).

floating contact of saddle to mucosa when the appliance is merely at rest.

This essential is at variance with the spring or "grasshopper leg" principle, which depends on the resiliency of metal bars or wires, and which, if called on to act, delivers undesirable forces and movements at both ends, clasp and denture, plus the possibility of their being rather easily bent out of alinement, or broken, or eventually breaking as a result of crystallization. The spring (and the appliance), if constructed on hard unresilient casts or models, must begin at once to "spring" during mastication, and deliver force on the anchor tooth or teeth, or the saddle must remain in mere contact with and not compress the mucosa, because there was no mucosa on the cast or model. If resorption occurs, the teeth and springs must follow or the saddle must always remain away from the ridge. The spring is the orthodontist's best friend.

8. The joint movement should permit clasps to be designed to best fit and hold individually, and allow the clasps and appliance to go on and off without

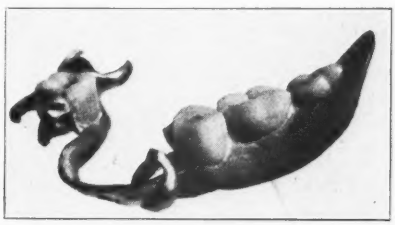


Fig. 4.—View of clasp in Figure 3, showing mobility out of the mouth.

stress and without regard to any unfavorable relation of the teeth, or necessity for parallelism.

Many impossible desirable features could also be enumerated.

Cast-clasps, with or without lugs, rigidly attached to mucosa-ridge supported appliances are unthinkable from the standpoint of dental engineering; scientifically and functionally, to say the least.

All honor to Dr. Nesbett, who introduced the cast-clasp. My recollection is he did not originally intend it to be used on mucosa-ridge supported appliances. There is no such thing as satisfactorily dividing the load of mastication between lugs and mucosa.

Wrought, or round wire, clasps, with or without lugs, which must move on the teeth, or move the teeth, if rigidly attached to the appliance are almost as impossible, theoretically at least, in spite of the fact that millions of them may have been worn, and are being worn, with apparent comfort.

In the case shown in Figure 2, the lingual bar is solidly attached (soldered) to the tooth-supported unit on the right side and also vulcanized into the saddle unit (or soldered, if a gold base) on the left. The left bicuspid

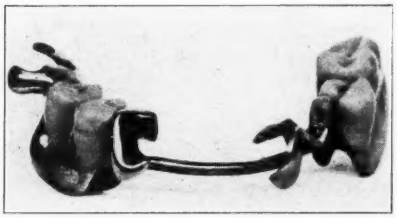


Fig. 5.—Type of appliance worn by author for several years with comparative comfort and without trauma or other damage.

clasp only has provision for motion between it and the appliance. The distance across the arch seems to provide sufficiently (though not ideally) for the slight motion resulting at the right unit when the left or mucosa side moves under mastication. The motion being slight, and much attenuated by the distance from "origin to insertion," is practically negligible.

Provided they are not made to do destructive work, cast-clasps will do little if any damage to natural teeth if clasps and teeth are given the proper prophylactic care. They will certainly require a long time to do as much damage as would result at once from cutting in with stones or burs for adequately anchored inlays or crowns, for attachments. And if caries or abrasion should ever occur, they are neither irremediable or necessarily disastrous.

Figure 5 illustrates an appliance (or its equivalent) worn in my mouth for several years with comparative comfort and without trauma, or other damage.

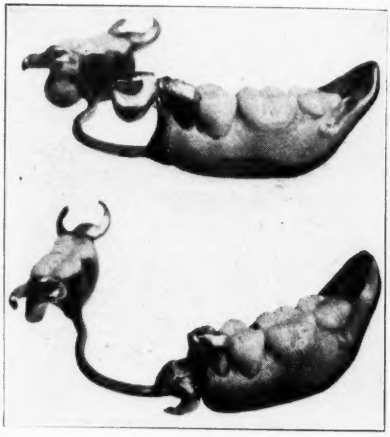


Fig. 6.—Practical appliance, now in use.

Movable joints, or whatever you please to call them, are even more indicated and applicable in bilateral mucosa-ridge supported appliances or so-called lingual or palatal bar posterior partial dentures.

I have studied and have used many of the antitrauma attachments that have been suggested and offered. Many are good in some or several features, their greatest fault, in the past, being weakness. None I have seen or used, including those shown in the foregoing illustrations satisfy all ideals.

Figures 6, 7 and 8 show other practical appliances, all in use; the oldest, about three years.

Figure 7 shows a bilateral, ridge-supported appliance with two lugged cast-clasps and joints. The position of the clasps in the mouth, at rest, is shown.

Figure 8 (same case) shows the mobility of the clasps, out of the mouth.

Figure 9, the same case, shows the metal parts in position on the cast prior to the final waxing.

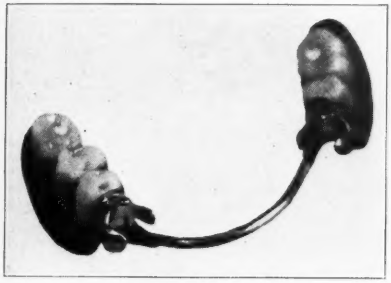


Fig. 7.—Practical appliance, bilateral, ridge-supported, with two lugged cast clasps and joints. The position at rest in the mouth is shown.

Just here provision is made to retain the working space in the joint. For this purpose, some form of cement or hard cast material (such as artificial stone) is built against the neck of the bicuspid, under the clasp (indicated by arrows) and up over and around the wire loop of the joint as far as the edge of the distal sliding member, which is fastened to the saddle. (This has been done before by others, perhaps in a different way.) This is to keep vulcanite out of all of the working space of the joint, also away from the neck of the tooth. This cement or stone must stick and harden, and must not be broken down from the set-up of the teeth to vulcanization. I use oxychlorid of zinc cement for this. It works like plaster, hardens and stays hard. If it sets too fast, a little borax may be added.

I ordinarily use vulcanite saddles and attach teeth, etc., with vulcanite, by preference. The inside of vulcanite saddles should be finished as well as the outside. I do not vulcanize at 320 de-

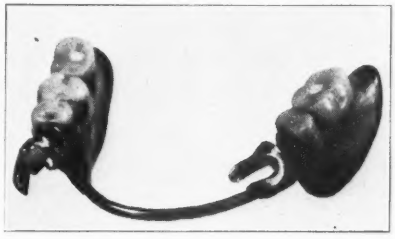


Fig. 8.—Practical appliance (Fig. 7), showing mobility of clasps out of the mouth.

grees for fifty-five minutes, cool off quickly and open at once. Good vulcanite results cannot be so obtained.

After the case is polished, the surplus occlusal edges of the joint (which were previously tacked with solder, with mica between, to maintain relations temporarily) are now ground away. The cement, or stone, in the working space of the joint, is broken up around an opening for the purpose, with some appropriate instrument, such as a pointed canal file, picked in from underneath. The clasp is now slightly moved, this helping to break up the cement, and thus releasing and establishing the joint movement. Soldering the occlusal edges of the sliding (with

mica between) holds the relation during assembly and until cut loose.

With this form of joint, the appliance, when at rest, as well as under load, is in full contact with the mucosa and has ample movement in many directions. The appliance, before the clasped tooth is required to do anything, is prevented from "skidding" backward, and is sufficiently held against lifting force, although a sticky caramel, or its equivalent, would probably gum the upper and lower together and unseat one or both.

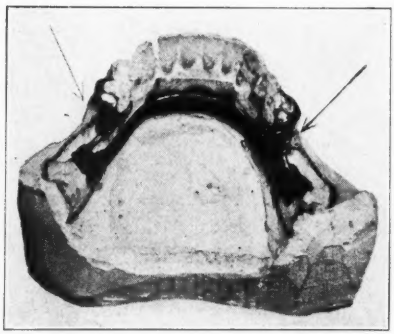


Fig. 9.—Cast showing appliance (Figs. 7-8) in position prior to final waxing.

Fig. 10.—Under side of joint.

Figure 10 shows the under side of

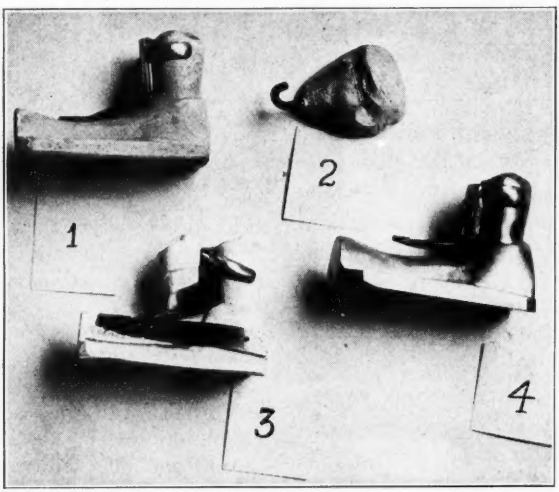


Fig. 11.—Close-up of joint, giving an idea of its application.

the joint. The seemingly excessive range of clasp movement (dangling) incidentally makes injury out of the mouth less probable. It also allows well-fitting clasps to go on teeth of almost any relationship.

Figure 11, a close-up of the joint,

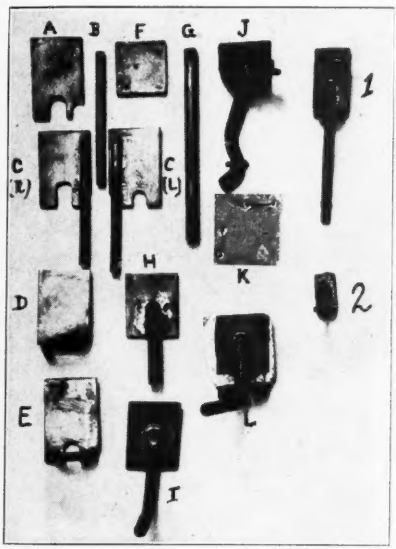


Fig. 12.—Practical details in making joints.

is intended to give an idea of its application.

I am saying nothing about accurate impressions, face-bow transfer, proper orientation, balanced occlusion, etc., except that they are necessary to best results.

Figure 12 is intended to show how you, yourself, may make such joints, if you wish.

Lack of time prevents full details of construction of the joint and the technic of application even if it might be of interest. I use a hard, high-grade flat clasp plate, from 26 to 24 gage; strong, hard round spring clasp wire, from 18 to 14 gage, as indicated by room and strength requirements; from 22 to 18 carat solder, and very thin pieces of mica, which are placed between the two flat sliding members when their surplus occlusal edges are soldered together. The two joint members are held in the upward position in the tweezers, with mica between, and are tacked with solder to maintain their proper relation. The mica when placed between prevents soldering except at the very upper edges. This soldering is to hold the saddle member of the joint in proper relation while soldering to clasp setting up the teeth and on through to vulcanization, or while soldering to a gold base if one is to be used. The joint may be made in any dimension or strength, limited only by the space it may occupy. The material for an average size costs about $2.50. Ordinary laboratory equipment—flat nose pliers (slightly modified with grooves), soldering tweezers, heat, saw, vise, file, etc.—are about all that is necessary in its construction. All soldering is done in the tweezers, except joint-to-clasp, which requires waxing the joint and clasp in proper relation, removal *in situ* from the cast, and a soldering investment. Frequent annealing during wire bending, and heat treatment of the whole, in an oven, subsequently is desirable.

BALANCING PRINCIPLES; THEIR APPLICATION AND DIFFERENCE IN PARTIAL DENTURES AND BRIDGE-WORK AS COMPARED TO FULL DENTURES*

By JOSEPH HOMER, D.D.S., New York City

BALANCING principles demand a consideration of mandibular movements, tissue relations and technic.

I.

Mandibular movements are controlled by the condyle paths, and arc of Homer (the combined overbite, overjet and cusp paths that govern the angulation of occlusal contact-approach and departure from central occlusion). The curve of Spee is not a guiding factor, as it does not parallel cusp facets, which are parallel to lines of masticating forces in normal occlusions. (Fig. 1.)

The condyles move in S-shaped paths, which are classified as two curves and a plane. We find these three elements in incisal paths also, when considered vertically and horizontally. Figure 1, *A.G.D.*, *B.H.E.* and *C.I.F.*, shows the comparative distances and directions traveled by the condyles and incisors of a normal mandible. Seldom do two mandibles move enough alike so that their movements can be interchanged or averaged for mechanical purposes, if the best results are desired.

*Read before the Section on Partial Denture Prosthesis at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 24, 1926.

II.

Figure 2 is a profile tissue relation diagram of an artificial or natural masticating machine. *SOME* represents the temporomandibular joint, and the comparative amount of compensation. The two rectangular blocks, maxilla and mandible, and the two connected curves and a plane, adjoining the upper and lower "blocks," are the upper and lower teeth, to which they are connected by brackets on the right. The planes represent cusp facets; the concave curves, sulci, and the convex curves, ridges between facets.

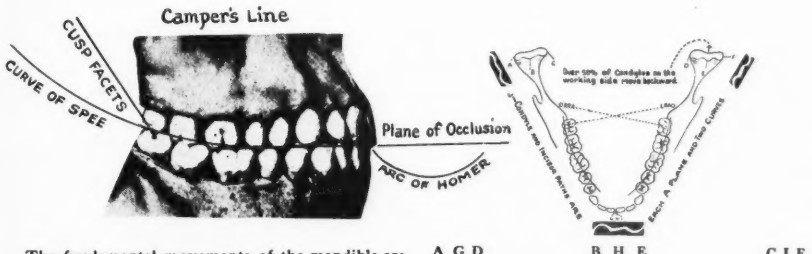
III.

Balance means an arrangement of occlusal surfaces to equalize physiologic masticating pressure on the peridental supra-osseous and other tissues supporting natural and artificial teeth. It should be the ideal of technicians to place all possible "compensation" between occlusal surfaces. (Fig. 2.) Balance cannot be obtained without central occlusion. Central occlusion is, therefore, a subdivision of balance, functionally, the end and least forceful or stressed part of the masticating excursion. Technically, central occlusion is a starting point, and may be obtained

without lateral or other balance, in which case occlusions are partially or centrally balanced. Infinite variation in technical skill, and different conceptions of supporting tissue relations from a biologic and pathologic view, make a relative term of the word "balance." Its accomplishment is a major operation, having five requisites: (*a*)[1] registration and recording central occlusion as distinguished from retrusion, with biologic and pathologic considerations; (*b*) cephalic index; (*c*) registration and reproduction of mandibular movements, including retrusion (Fig. 1); which is a component of lateral masticating excursions, with biologic and pathologic considerations; (*d*) full physiologic occlusion for partial, bridgework and inlay restorations (this law also governing orthodontic treatment, and its general disregard being regretted); (*e*) partial physiologic occlusion in full dentures.

I do not use bite rims, gothic arch, tracings or facebows, and place the "area of occlusion" (Fig. 2) in either partial or full dentures according to esthetic requirements, making it independent of balance.

The bite or central occlusion is registered on wax by a series of successive identical closures from a nonstressed position. Able technicians may advance the bite 2 mm. or more in reconstruction or treatment cases and full cases, to compensate for the upward and forward settling of the mandible.



The fundamental movements of the mandible are two continuous arcs to a chord, with a right and left spiral variation. Cusp facets are not parallel to the curve of Spee (so-called compensating curve) which is anatomic—not mechanical.

All movements are of different lengths and angles The major part of anterior movements are plane Lateral movements are spiral with two rotation axes and horizontal radii

Fig. 1.—Control of mandibular movements by condyle paths and arc of Homer.

My conception of instrumental recording of central occlusion (which may be termed a static as compared to balancing movements as dynamic) being three shouldered screws, two of which are pointed, resting in counter sinks of a hole and a slot, the third resting on a plane, the name "relator" is submitted as more descriptive than articulator. (Figs. 3 and 5.)

In full or partial dentures, where typal form is not obvious, it should have been obtained by taking the cephalic index, viz.: If the extreme width of the cranium is 75 or less of

1. Bull. Chicago Dent. Soc., Aug. 6, 1926, p. 14.

the extreme length, it is a tapering form that will favor protrusive movements; if between 75 and 85, a square favoring lateral movements; and over 85, an ovoid type favoring neither. (Six-inch Starret calipers and a 12-inch rule are the only instruments used.) Masticating or balancing excursions are slightly longer on partial dentures or bridgework than in full dentures. (Fig. 4.)

naturally," closing his own jaw back to central occlusion. After rehearsing movements on both sides, he says "Close forward," or "Stick out your chin;" at the same time, tapping on the lower incisors and protruding his own chin and showing his teeth. He should always have the patient start from central, then open (not slide) and close and hold a few seconds in a balancing

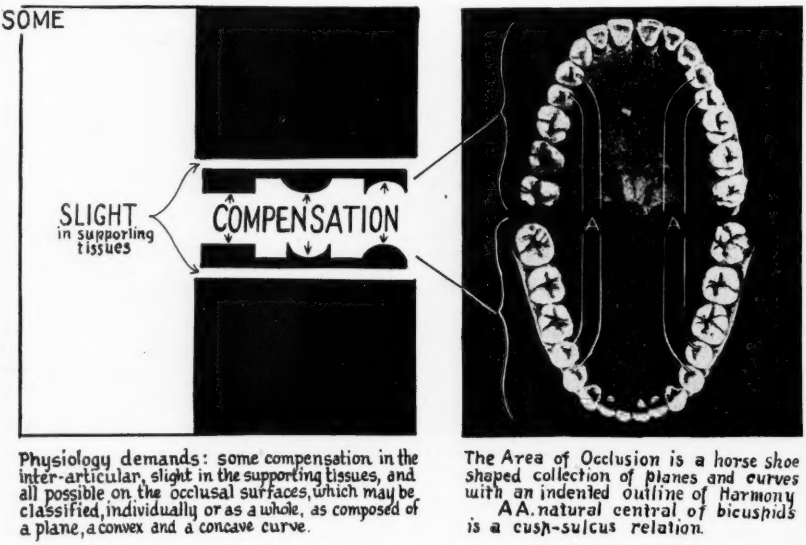

SOME
SLIGHT
in supporting tissues
COMPENSATION
A
A
Physiology demands: some compensation in the inter-articular, slight in the supporting tissues, and all possible on the occlusal surfaces, which may be classified, individually or as a whole, as composed of a plane, a convex and a concave curve.
The Area of Occlusion is a horse shoe shaped collection of planes and curves with an indented outline of Harmony
AA. natural central of bicuspids is a cusp-sulcus relation.

Fig. 2.—Profile tissue relation diagram of artificial or natural masticating machine.

REHEARSING PATIENT

The patient is prepared for rehearsal and registration of mandibular movements (in either partial or full dentures) by being raised to almost parallel eye level and adjustment of the chair to a comfort position. The operator taps one cuspid lightly with the index finger and says "Open and close on this side," at the same time moving his own jaw sidewise. He next says, "Close position, which is slightly beyond end to end, but not out of contact.

REGISTRATION OF MANDIBULAR MOVEMENTS (FIG. 5)

(*a*) Soften in hot water about three-fourths inch of the working margin of a relator register, made of two thicknesses of base-plate wax, folded over thin silk or foil 0.003.

(*b*) Cut out a triangular section (suggested by Boos) in the cuspid re-

gion to determine whether the teeth are in normal lateral cuspid relation.

In a refined technic, sometimes three more intermediate registrations are

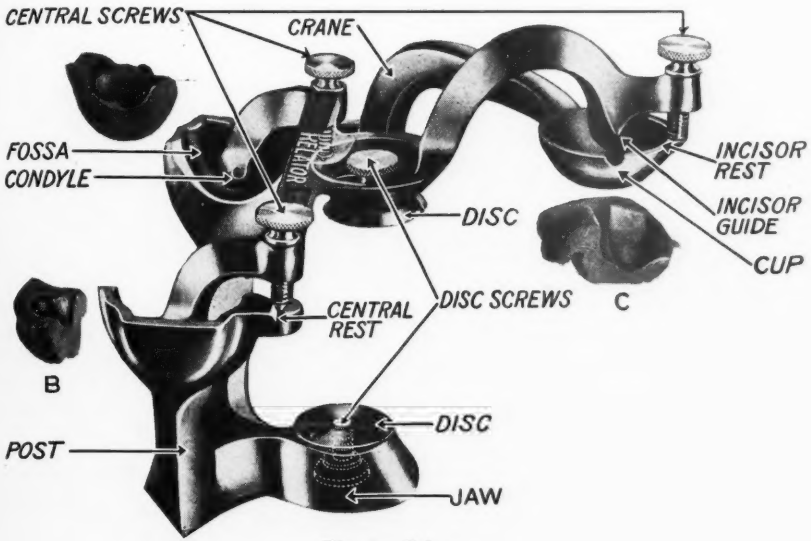


Fig. 3.—Relator.

Then test the incisor area likewise for protrusion. (R. A. & L.)

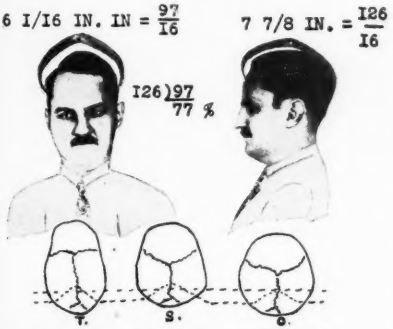

6 I/I6 IN. IN = 97/I6
7 7/8 IN. = I26/I6
I26)97
77 %
T.
S.
O.
If width of cranium is 75% of length tapering, between 75% and 85% square, over 85% ovoid. Cranial outline gives typal form of cuspids and bi-cuspids. Top dotted line incisors- Lower line molars.

Fig. 4.—Taking cephalic index.

made, which would be labeled *R-I*, *A-I* and *L-I*. Some patients may be guided by placing the thumb on the zygoma and the fingers on the rim of the jaw, or the reverse for the opposite side; this as the teeth come in contact with the wax, and guiding them through. Negative patients may be assisted by pushing the thumb against the jaw, and against the line of directed movement. In exceptional cases, the operator holds or assists the patient to hold the jaw in correct position and make a "lock-in-bite" by pushing the compound between the teeth, using the compound as a guide in making registrations. (Fig. 5 *L. B.*)

RECORDING MANDIBULAR MOVEMENTS

The ideal of the following steps is to reproduce the movements of that

part of the mandible covered by dentures and to reproduce in diminution or magnification the condylle and incisor paths.

(*b*) With central screws down (Fig. 5 *C.C.C.*), gently seat condyles to central position, and remove vertically (should condyles stick to compound, a slight oscillation will loosen). Feel inside the impressions of the condyles (which are now termed negatives); and if it is beginning to harden, dip in hot water to keep plastic.

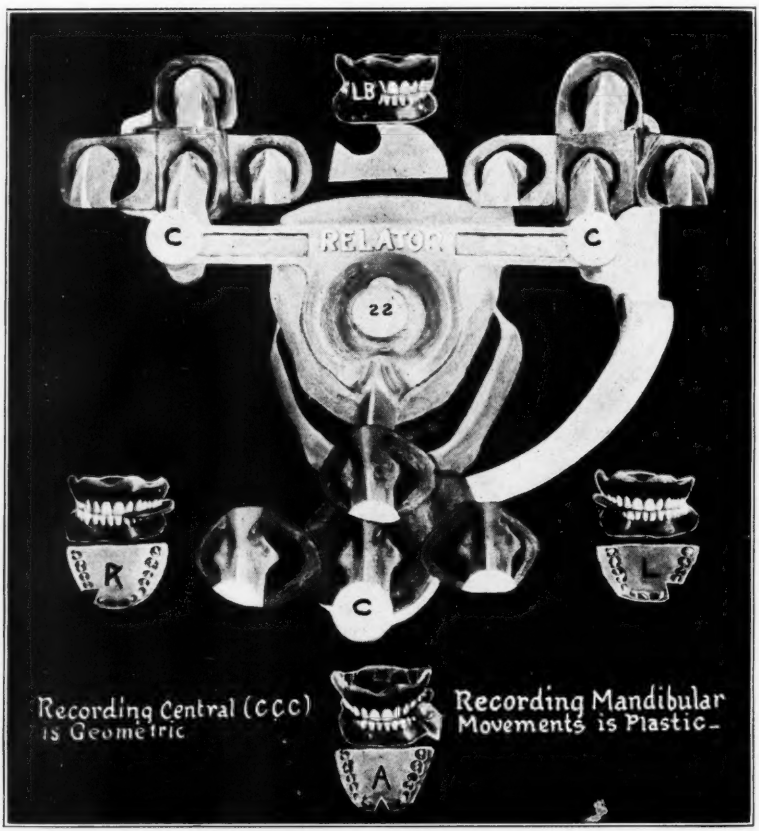


Fig. 5.—Relator.

(*a*) Put softened compound (retained at 135 F. in a Supplee heater) in the fossae and the cup of the relator, and push the small compound flaps under the compound for retention. (Fig. 5.)

(*c*) Turn central screws back one-

eighth inch and correctly seat any one of the registrations on the lower cast, or trial plate.

(*d*) Carefully replace the condyles in their central position impressions, in the soft compound.

(*e*) Rest the teeth on registration.

(*f*) Slide the teeth down the cusp impressions to place and remove vertically, still keeping the compound soft. Likewise, seat the other registrations and slide the condyles and incisor guide to position.

heated compound in the fossae and cup; letting the condyles drop too far in the soft compound; forcing the condyles and incisor guide without reheating the compound and after it has begun to harden. (Fig. 3 *A.B.* and *C* show profile, transverse, and diagonal sections of negatives made from normal mandibular movements.)

It is submitted that the adjustable part of an instrument can be made only by a technician, and is not a manufacturing proposition.

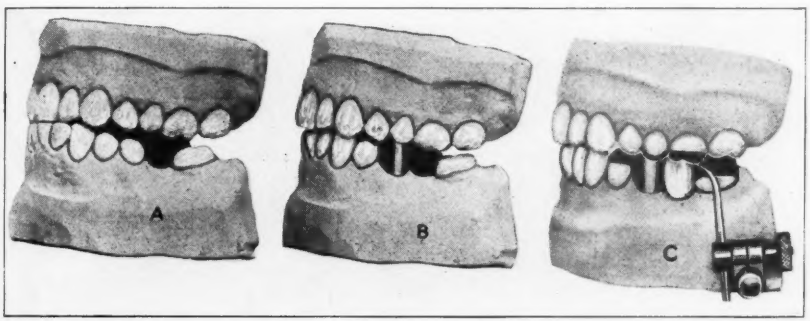


Fig. 6.—Angulating or measuring individual cusp facet inclinations.

"NEGATIVE" DEFINED

You have now completed three negatives, which are four or more adjoining impressions, continuing into each other, of condyles or incisor guide (geometrically, a proximity of points) in each fossa and cup, made while the compound is continuously soft, by sliding the condyles and incisor guide in the compound always outward, thereby preventing one impression or tracing distorting another. These may be filed as records. The usual mistakes are: using too much overheated or under-

The essentials in angulating or measuring individual cusp facet inclinations to restore natural occlusions (Fig. 6) are:

(*a*) Survey, noting lack of balance.

(*b*) Raise the bite, where necessary, with temporary crowns, with the proximal surfaces cut out to avoid grinding the natural teeth and fastened with compound or guttapercha on diametric, or diagonal teeth. (Cummer classification.)

(*c*) Locate the point of a surface gage (previously fastened to the lower cast in mounting) on the cusp points

of the upper cast (in central or balancing positions).

(*d*) Move the upper cast from central to masticating positions or from balancing to central positions, to ascertain the cusp facet angulations.

(*b*) Move the upper cast in protrusion and again locate the upper divider point on the same cusp point and the lower divider point vertically on the lower cast.

(*c*) Tilt combined opposing second molar axes to right angle points on the lower cast and, while the supporting wax is soft, move the upper cast in protrusion, ironing opposing cusp facets to exact angulations from the tilted approximations.

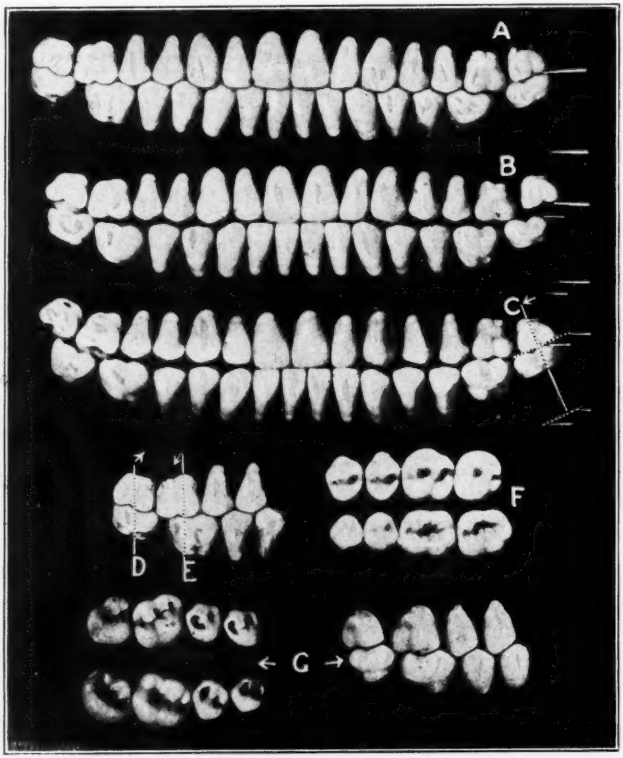


Fig. 7.—Angulating artificial cusp facets.

There are five essentials in angulating artificial cusp facets (Fig. 7):

(*a*) Locate one point of dividers (set) on the point of the distobuccal cusp of the upper second molar, and the other divider point vertically on the lower cast.

(*d*) For greater contact in balanc-

ing position, tip the combined axes of opposing molars or bicuspids saggitally. This lengthens the lingual cusps.

(*e*) For greater contact in working position, tip the combined axes of opposing molars or bicuspids bucally. This lengthens the buccal cusps.

Long cusps may be used instead of "tilting." Rotating teeth or paralleling the guiding grooves and ridges on the working side to balancing angulations lengthens cusps, and reduces displacement, if the patient is instructed to masticate against the lingual cusps of the lower dentures instead of the buccal.

Both surface gage and dividers may be discarded by experienced technicians.

It is my ideal, as described by Hall, in full dentures, to have the cuspids and bicuspids clear in working and balancing positions, thereby permitting food to fall into the mesh, increasing crushing leverage and reducing displacement. This is accomplished by increasing the overbite and reducing the overjet.

In essence, balance is effected in full dentures by tilting the combined axes of opposing teeth and milling on the instrument, three areas of balancing contact being the ideal; while in partials, direct angulation and construction of cusp facets on natural or artificial teeth in addition to "tilting" is required. Root movement is often advisable. Milling is also done on the instrument and in the mouth, and all possible balancing contacts on all teeth are required.

Because of the general need of a more definite conception of the subject, a new term and its definition are submitted; namely, occlusodontia, the science of relating occlusal surfaces of teeth for greatest efficiency of the individual either by alteration, construction, arrangement or root movement.

DISCUSSION

John H. Hospers, Chicago, Ill.: Dr. Homer's paper is unique in its field in that it is the first analytic study of the comparative difference in balance between partial and full dentures. Mr. Hanau, in his paper read before the Chicago Dental Society annual meeting in January, 1926, said, "The fundamental laws involved are practically alike for orthodontia, periodontia, crown, bridge, partial and full denture work, though the manipulations of their application differ . . . It is emphasized that the laws of articulation just submitted apply to natural as well as artificial masticatory surfaces. The range of application of these laws cover more than ordinary needs." This indicates that Mr. Hanau has not thought them of enough importance to make a special study of them. This paper shows us that there is a radical difference in the laws that apply to balancing partial and full dentures. I have always endeavored to apply the same technic in both types of cases. Granted that often the desired end was not secured, I did not realize my deficiencies. The paper has given us a true insight into the most simple and most accurate method of balancing teeth. To me, Dr. Homer has solved a very trying problem. It now remains for us to apply it. I really believe that, in the plastic principle, we now have the solution to the articulator problem. The continued use of the relator grows more and more interesting, and one becomes most enthusiastic as case after case yields to its magic. The paper is full of new and interesting features. For instance, I do not know of having read of setting up the teeth on full dentures for esthetics and then balancing the molars and bicuspids irrespective of making any change in the alinement of the anterior teeth. We have also received a unique and accurate method and instrument for definite measurement of cusp angulations; a factor of greatest importance in the change of cusp angles for the proper seating of partial den-

tures or any partial restoration. Dr. Homer couches his paper in such technical language that it requires a great deal of study to get the full import of the message that he has brought to us. I suggested a change to a somewhat freer and easier style; but I am glad that it has been left as it was. To those of us who are truly interested in a problem like this, a paper of this kind is of greater value, since we get our benefit after we have striven for it. There are, therefore, a number of points that need elucidation, and starting from the beginning of the paper I shall try to make them as clear as possible. Each cusp surface and condyle and incisal path includes a plane, convex and concave curve. (Fig. 1.) This shows how complicated an instrument would have to be in order to be mechanically correct. Figure 2 visualizes the complexity of our problem, and if we add to these combinations the influence of malposed teeth and of poor occlusion on crowns and bridges, the problem certainly becomes one of the first magnitude. This last complexity Dr. Homer has euphemistically called the plane or line of harmony. A more appropriate term would be the plane of discord. When obtaining balance in full dentures, we have to contend with but one supporting tissue factor; viz., that of the soft tissue, although the hard and dense areas of the palate cannot be disregarded. In partial dentures, we have to consider the soft tissues, the hard areas and the natural teeth remaining in the mouth. In order to obtain balance in full dentures, only three balancing areas are necessary at any one time, because all the teeth are on one base; while balance in partial dentures can be obtained only by the balancing of a large number of areas, besides taking into account the supporting tissues, such as the teeth, the soft tissues and the hard tissues beneath. This makes a large number of factors to take into consideration. This problem has heretofore been considered the minor one, because we have thought that the partial denture that was comfortable was fulfilling its requirements; but malocclusion of the partial denture has a pernicious and devasting effect on the osseous tissue around the supporting teeth, and also that underlying the saddle areas. No more pertinent reason for the use of a plastic material for recording the condyle paths need be given, since balance is absolutely necessary for personal comfort and the permanency of the work. In his paragraph on the variation of opinion, as to what is included in a balanced denture, Dr. Homer says: "Balance is a relative term." It is a fact that there is no definite opinion as to the time when balance exists; for example, no two dentists make the same tests to determine whether artificial teeth are really balanced or not. I believe that the fine point at which the pressure of the denture on the supra-osseous tissues, and the force with which the occlusal surfaces and cusp angles come into contact, without strain, in any position of the mouth, with like points and surfaces of the opposing teeth, is balance. Yet conditions are such that further pressure could be made without producing further strain. That would be ideal. Such a condition cannot exist in the mouth because the resiliency of the gum, or supra-osseous tissue will always allow for a slight tipping of the dentures at the point of greatest pressure. So it is possible to get good balance on a full denture because it is a unit; viz., all the teeth are on one base, until the time that food is inserted and mastication begins, when we have a condition of strained balance. A small amount of this strain may be beneficial because of its stimulating effects on the supporting tissues; but no one has yet been able to determine, or even to measure, that strain. Dr. Homer overcomes this to a large extent by having the cuspids and bicuspids clear in the balancing positions, thereby permitting the food to catch in the mesh and to increase the crushing leverage, and reduce displacement. This, I believe, was originally brought out by Rupert E. Hall. The tests of a well balanced denture are: 1. Teeth in centric occlusion and firmly closed should resist the insertion of a knife blade, or some sharp instrument, between the upper and lower molars without movement of the bases. 2. Teeth placed in either of the lateral bites or the protrusive bite should allow for similar tests. Such a condition cannot be produced by any mathematical device; but only "on an

instrument that can reproduce the movements of that part of the mandible covered by dentures and to reproduce in diminution or magnification the condyle paths." It is interesting to note that the relator does that very thing. After the teeth have been articulated, the bases are inserted in the mouth, and the wax registers for recording the positions are softened and used as indicated in the paper. It must be understood that the relator in itself cannot solve these problems. It does not require a large amount of technical skill, but it is self-evident that some fundamental knowledge is necessary to its successful employment. I therefore wish at this time to caution those who are not acquainted with its possibilities about speaking against the instrument. It has been my privilege to use a number of the various types of articulators on the market, and also to know about those that I have not used. Every one of them has served a purpose; but the final solution of the problem lies in the plastic technic. Whether or not the relator is the instrument, we cannot say; but it is reasonable to suppose that an instrument that is capable of making a negative of the condyle movements in a plastic material, that becomes solid and retains the form of the negative, would be the instrument to use when we seek the greatest refinement in our work. The problem of obtaining balance for partial cases is one in which the patient makes the final decision. It is not always possible to obtain the consent of the individual, so that the cusps of the natural teeth may be reduced, or even raised, to an harmonious alinement. In fact, they do not see the ideal as we see it. This may necessitate the addition of onlays to the denture, to build up the proper angulation of the teeth that are below the occlusal plane.

SYSTEMIC ASPECTS OF PERIODONTAL DISEASE*

By HERMAN D. OSGOOD, M.D., Boston, Massachusetts

IN presenting a paper having to do with the systemic aspects of periodontal disease, I fully appreciate that the recent dental literature already contains many excellent presentations of the subject. My purpose is to present some of the facts which must be evident to any observant physician who has had the opportunity to make a careful systemic analysis of cases involving periodontal conditions; and to correlate the various factors in the systemic etiology in the light of modern observation and experience.

Various local and systemic theories as to etiology are to be found, but, on the whole, writers on the subject seem to agree that the disease is a complex one in which both local and systemic factors play a part.

It is but natural for the trained periodontist to minimize the systemic etiology and to attribute the disease almost entirely to local conditions such as ill-fitting crowns, overhanging fillings, faulty contact points, the chemical action, accumulated food débris and, especially, the trauma produced by unbalanced occlusal strain; and to make the claim that, by proper correction of these defects, followed by adequate prophylaxis, a permanent cure can be obtained. Unquestionably, brilliant results have been obtained by skilled periodontists who confine themselves solely to local treatment; but, in too many instances, these results are only temporary, and the passage of a relatively short interval of time often shows a relapse approaching the original condition. That, in many such instances, a relapse is due to failure or inability on the part of the patient to continue the prophylactic régime is undoubtedly true; but why is it that some patients must spend twenty minutes a day in brushing and scouring if they wish to retain healthy gums, and others, with many or all of the local conditions above cited, apparently get along with little or no prophylactic attention?

The fact that local conditions alone are insufficient to account for the etiology of the disease must be obvious to the observant dentist with a large clinical experience. He must have seen many patients with traumatic occlusion, lack of contact points, poorly fitting crown and bridge work, calculus deposits and filthy mouths, who yet show no evidence of periodontal disease. He also must have seen many other patients whose mouths, from a standpoint of dental reconstruction, are in perfect condition, and yet who experience severe gingivitis or pyorrhea from relatively trivial causes.

Periodontal disease, therefore, cannot

*Read before the Section on Exodontia, Anesthesia and Roentgenology at the Seventh International Dental Congress, Philadelphia, Pa., Aug. 26, 1926.

be regarded as a pathologic entity which can be attributed to any one cause. It is rather a local manifestation or symptom resulting from the interaction of a number of conditions which may be either local or systemic, or both. The work of recent investigators would seem to indicate that we have to deal with two distinct conditions, one a gingivitis due to local irritation alone; another, a periodontoclasia or softening of the alveolar bone due to a difficiency or debilitating disease; and that the cases of greatest severity are those in which such predisposing systemic causes so lower the resistance of the alveolar tissues as to favor the rapid extention of the pathologic process excited by local trauma, stress or strain.

Two illustrative cases of common occurrence will emphasize these points. Consider first the patient whose gums and alveolar bone are in good condition, but at certain places in whose mouth there exists one or more local causes of irritation. Clinical examination will show that the inflammatory changes in the gingiva are located solely about these points of irritation and do not occur elsewhere in the mouth. Roentgen-ray films of such a case will further show normal alveolar bone with the exception of marginal pericementitis or local pockets which are limited to and sharply circumscribed about the points of irritation, traumatic occlusion or overhanging filling as the case may be. Here, then, we have a condition primarily due to local irritation alone, and the clearing up of the defects should be followed by complete recovery if the pockets and denudation of the root have not progressed too far.

Consider, now, another type of case in which the gums are blue and spongy, bleed easily on pressure and may even exude a little serum or pus at the gingival margin. Even in the absence of local causes of irritation, the roentgen-ray film will show a much decalcified alveolar bone with respect to both the lime content as evidenced by the density, and also the character of the trabecular markings; so much so, in fact, that the white line of the lamina dura will stand out by contrast, a picture that is comparable roentgenographically with that of lime salt resorption as seen under similar conditions in other bones of the body. Here, then, we have primarily the result of a systemic condition. In such cases, there may be no local irritations to result in gingivitis, marginal pericementitis or pockets; but the alveolus may be so soft that the teeth can be freely moved by the finger. In the latter instance, correction of the diet and habits of living in many such cases will, over a reasonable period, show a definite tightening of the teeth, and roentgen-ray examination at the later date will show alveolar bone more nearly approaching the normal structure and density.

That debilitating diseases such as syphilis, chronic nephritis, tuberculosis and diabetes play an important part in lowering the resistance of the alveolus is, of course, obvious, but these conditions alone are not sufficient to account for the wide prevalence of periodontal disease.

That systemic toxemias, defective diet or deficiency of calcium can produce periodontal lesions, and corrective measures can bring about repair is evident from a review of the recent literature. The writings of Talbot, Homberger, Bunting, Burnett and Spalding all stress the importance in

etiology of diets deficient in organic calcium. Howe, by feeding diets deficient in vitamin C (antiscorbutic) and calcium, has been able to produce in monkeys every stage of periodontal disease, from slight gingival redness to complete destruction of the supporting tissues. Heavy tartar deposits were formed indicating that the calcium was not being properly metabolized but was being excreted into the mouth. This cleared up on correction of the diet. McCollum and Grieves were able to produce periodontal lesions in rats by defective diets. The production of such typical lesions in experimental animals seems to prove that the primary condition which renders the gums and alveolar tissues susceptible to traumatic occlusion is an abnormal metabolism due to a protracted poor diet. That the modern diet of civilized races is deficient in vitamins, calcium and roughage has long been recognized. We eat too little fresh vegetables, too much meat, refined cereals and contents of tin cans. Vitamins are readily destroyed by heating, drying or long keeping, and the calcium content of whole grain wheat is almost completely eliminated in milling and refining.

Overeating and underexercise also play a very important part. G. V. Black was able to produce excessive tartar deposits about the teeth simply by overeating, and Broderick has given us a very interesting study in the relations of exercise to the carbon dioxid exchange and its effect on the hydrogen-ion concentration in blood, from which he deduces that abnormal calcium metabolism as seen in periodontal disease can be fully as much the result of insufficient exercise and faulty elimination as deficiency in the diet itself. Gibbs, in his paper on acidosis, comes to a similar conclusion. Tyree aproaches the subject from a different angle in reporting 165 cases of gastric hyperacidity, 54 per cent of which showed advanced pyorrhea, and 24 per cent, moderate lesions. He notes that, in each instance, the gastric disorder antedated the onset of periodontal disease. The diet of these patients had been habitually low in calcium, as is the rule in such cases. He also states, which some may question, that a number of these cases showed a complete clearing up of the periodontal lesions under systemic treatment.

From the foregoing, it might appear that the deficiencies of our modern diet, are the essential systemic cause of lowered alveolar resistance through decalcification or softening, and that these deficiencies produce conditions favorable to the onset of periodontal disease.

If this were the whole story, it should be possible by dietary control to supply the chemical materials required and thereby eliminate the systemic side of the periodontal problem. Clinical results in this respect, however, have, as might be expected, been disappointing, first, because it is practically impossible to get the average individual to stick to such a modified diet, and, secondly, because other equally important factors must be taken into consideration. The work which has been done on rickets in children, for example, has proved that the administration of calcium alone is not sufficient. The calcium must be in an assimilable form, and the organism must be in a position to utilize it. Here the ultraviolet rays of the sun play a most important part. They are just as essential to the animal metabolism as they are to the plant in enabling the latter to utilize its chlorophyl. The

adult sedentary worker gets far too little sunlight in his daily activities, but he needs it just as much as the child with rickets. It is remarkable how quickly these children pick up when fresh air and ultraviolet rays are added to their regimen.

The small intestine is the seat of calcium absorption. As Howe points out, the absorption of food elements depends first on perfect digestion, and, secondly, on a clean active absorbing surface. The roughage or cellulose residue from vegetable diets lightens the food mass, stimulates peristalsis and keeps the absorbing surfaces clean. Monkeys which he fed on a concentrated diet of pasty consistency were found to have a flaccid, semi-athrophied intestinal wall covered with mucus and slime; whereas, those to whose diet filter paper (cellulose) was added were found to have clean healthy intestinal absorbing surfaces. That the same is true of the human organism cannot for a moment be doubted.

In our own work, consisting in careful health surveys of below par individuals suffering from no organic disease, we have been impressed by the frequency of the coexistence of periodontal disease in the mouth with alimentary tract stagnation, particularly in the cecum and terminal ileum.

This, in my opinion, is the most important factor that we have yet considered. The human organism is an engine which not only requires suitable fuel for its activities, but also must eliminate the waste. If the high meat protein content which we find in our average diet is not used up in the body economy, it decomposes into toxins, which are reabsorbed in the cecum, producing a below par state, and lowered vitality and resistance, as a forerunner to definite organic disease.

Is it not possible that the coexistence of these two conditions is more than a coincidence? and that, in autointoxication and protein acid ash, we may have another factor of equal importance with dietary deficiency? If, in these days of lack of exercise and sedentary living, we cannot keep the bowel tone and elimination up to normal, let us at least eliminate the excess of meat protein and its attendant decomposition toxins.

Before leaving this subject of colon dysfunction, let me emphasize the fact that a daily bowel evacuation does not mean that the individual is not "constipated." The roentgen ray or charcoal test may show that the evacuation was only a small part of what it should have been, or again it may have been several days behind normal schedule.

If, therefore, we are to obtain the best results for our patients, the physician and periodontist must work in close cooperation. The excellent results which the periodontist obtains by local treatment alone even in apparently unfavorable cases should not be overlooked, but the periodontist who believes that he can permanently cure all cases by local treatment will, in many instances, fail of the ultimate that he might obtain and may find his excellent work undone by the systemic factors which he has minimized.

Cases should be studied from both local and systemic sides. It will be found, as Quinby has stated, that they will fall into four main groups.

1. Normal alveolar structure with no local trauma = no periodontal disease.
2. Normal alveolar structure with local trauma = gingivitis, marginal pericementitis or pockets, localized to the site of irritation.

3. Defective alveolar structure without local trauma = softened alveolus, without gingivitis, marginal pericementitis or pockets.
4. Defective alveolar structure with local trauma = the most advanced cases and poorest prognosis.

It is with the last two groups, and they are in the majority, that this paper has to deal.

One cannot expect the dentist to be an expert in laboratory methods of medical diagnoses, but he should unquestionably be sufficiently well trained in physical examination and history taking to determine when the patient's condition is such as to warrant the physician's attention. Since so much of dental literature and research deal with the problem of diet, it might also be within his province to advise the patient as to diet in the absence of organic disease, recommending leafy vegetables, milk, whole grain wheats, fresh fruits, etc., in place of a diet consisting largely of meat, white potato, prepared cereals and canned goods.

SUMMARY

1. Periodontal disease is essentially a disease of civilized races.
2. It is due either to local or systemic factors or a combination of the two.
3. In those types primarily of local origin, the pathologic process is limited to the point of irritation.
4. In those types primarily of systemic origin, there is a decalcification or rarefying osteitis of the alveolar tissues, upon which the results of local irritation are superimposed.
5. The disease can be produced artifically in experimental animals by feeding a diet deficient in vitamin C and calcium.
6. The modern civilized diet is deficient in vitamins, calcium and roughage.
7. The calcium metabolism is not only dependent on dietary factors, but also on sunlight, exercise and general body health.
8. The absorption of toxins through alimentary tract stagnation, especially on a high protein diet, not only produces acidosis and autointoxication, but also lowers the tissue resistance, favoring the spread of infection when given access through local trauma.
9. Excellent results can be obtained by local treatment alone but can be maintained only as long as the prophylactic régime is continued. But many disappointments can be avoided and much success can be obtained if the periodontist will cooperate with the physician in restoring defective body function as well as correcting traumatic occlusion and eliminating local sources of irritation to the gums.

THE AMERICAN DENTAL ASSOCIATION

By LOUIS OTTOFY, D.D.S., M.D., Chicago, Illinois

THE Sixty-Ninth Annual Session of the American Dental Association, held at Detroit, in October, 1927, has passed into history. These annual meetings increase in value and interest from year to year. The prodiguous work performed during the meetings is astounding. I have made an analysis of the activities at this meeting, with the following result:

PERSONAL

The number of persons delivering addresses and lectures, reading and discussing papers and giving clinics totals	566
Of these the number taking part more than once was	134
Making the total of participants	700

The number was no doubt greater, but at this writing the names of many who took part in the discussions are not available.

ACTIVITIES

Addresses on general subjects	7
Addresses and lectures on allied subjects	7
Scientific, health and technical exhibits	18
Addresses and talks on dental subjects, to school children, the general public, at clubs and societies and over the radio	46
Motion pictures relating to the teeth and dentistry, shown at various times during the meeting	68
Papers and essays on dental subjects	118
Clinics pertaining to dentistry	438
	702
To this should be added the splendid exhibits made by dental manufacturers, dealers, laboratories and allied industries	136
Total activities	838

The versatile nature of the meeting, covering every phase of dental practice, may be noted from the various subjects treated in papers and at the clinics:

Periodontia and pyorrhea	13
Casting technic	20
Radiodontia	24
Orthodontia	25
Anatomy, histology, physiology, pathology, bacteriology and chemistry (research)	30
Oral surgery, exodontia and anesthesia	44
Ceramics, including jacket crowns and inlays	59
Operative dentistry, materia medica and therapeutics, including root canal therapy and filling	64
Full and partial denture prosthesis	85
Prosthetic dentistry, including crown and bridge work	91
Unclassified (overlapping from one branch into another)	93
Mouth hygiene, preventive dentistry, nutrition and diet	154
	702
Exhibits of manufacturers, dental laboratories, etc.	136
Total	838

In addition to these activities of the Association, there are many allied meetings held at the same time and place. The several dental fraternities; the

American Federation of Women Dentists; the Woman's Auxiliary of the American Dental Association; the American Society of Oral Surgeons and Exodontists; the American Academy of Periodontology; the Association of Military Dental Surgeons; the American Dental Hygienists Association; the American Dental Assistants Association and others. An association of pedodontists was also effected.

None of the time of those in attendance who are not officially connected with the organization is taken up by any of the vast business of this large body of men and women. The business transacted by the Board of Trustees and the House of Delegates, and the many valuable reports read, are not included in the foregoing tables.

Nor are sports, such as golf, neglected. The many social functions tend to relieve the pressure on those who come to these meetings to teach or to learn. A most delightful feature of one evening was a pageant of dental history, entitled "Onward." It was prepared by Dr. Grace Rogers Spalding, Birmingham, Mich. The purpose of the pageant was "to stimulate an interest in the history of dentistry, particularly as it pertains to the biography of pioneer dentists." It represented the only meeting the Association had previously held in the city of Detroit, in 1874. There were thirty-seven dentists of that day represented, all of whom were present at that meeting and made history at that time. Not only were the impersonations splendidly carried out as to the bearded features and dress of the individuals, but even the voices and personal characteristics were most admirably imitated. I happen to have known personally twenty-six of the group, and the young men who represented the pioneers of a bygone day were certainly well trained for their parts.

At the present time, about 50 per cent of the dentists of the United States are members of this, the greatest dental organization in the world. It is inconceivable to me how the other half can successfully practice dentistry without this affiliation. By successfully, I do not refer merely to finances, but to that greatest of all successes: the giving of the best service within one's power to the community in which one lives. There is so much that is new, so much progress, that I cannot understand how one can do his best, without learning as he goes along. I have always been a member of one or more dental societies since 1881, and I am frank in stating that whenever I did my best for my patients, it was due to something I had learned at a dental meeting. Much may be acquired by reading and by observing the illustrations in dental journals, but all that is only a mite when compared with listening to a speaker or watching work at a clinic.

I am not personally interested in any dental society otherwise than as a member; I hold no office; I want no office; hence I am free in urging every dentist who has not yet affiliated with organized dentistry to do so without delay. I have never met a dentist who regretted that he was a member of a dental society. It is the cheapest post-

graduate course one can get. According to the present system, joining the local society gives one all the privileges of this great Association; comradeship with his fellows, and constantly renewed interest for the benefit of his patients. I strongly and earnestly appeal to all nonmembers to write to the secretary of their local or state society and get their names on the roster of membership at the earliest practicable moment.

THE NEED FOR A RECOGNITION OF THE CAUSE IN MOUTH AFFECTIONS

By A. MOORMAN HARDAWAY, D.D.S., Louisville, Kentucky

MEMBERS of the profession are too prone to treat mouth conditions indefinitely without going sufficiently into the cause of the trouble. No medical man or dentist should treat a case for any length of time, particularly when the case proves stubborn, without seeking in every way possible to learn the cause of the affection. It is true that frequently the cause is difficult to determine, but at least a process of elimination may be instituted, so that a more intelligent handling of the case may result.

In the following case histories it would seem that a serious oversight had been made, to the great detriment of the patient and perhaps to the dentist.

REPORT OF CASES

CASE 1.—Miss Z, a domestic, aged 19, came in because of a pain about some old shell crowns. There was a congested appearance but nothing that indicated serious trouble. Her dentist, thinking that Vincent's infection might be present, painted the tissue with mercurochrome and dismissed the patient with instructions to return in a few days if there was no improvement. She returned in about a week with more, though not sharp, pain, and was referred to me. The gingival tissue about these crowns and lower anterior teeth was of a dark red with a slight purplish tinge and a blending of a dark pea-green. The tissue had a melted down appearance in the interproximal spaces and around the necks of the teeth with a very wet or slightly glazed sloppy appearance. There was no depth to the pockets, and no grayish or white appearance as in Vincent's. The Wassermann reaction was 4+.

CASE 2.—A case showing about the same symptoms as the one above was referred to me by a physician. The patient was a woman about 50 years of age. The physician, when referring the case, did not mention the fact that the patient had been coming to him occasionally for syphilitic treatment for three years.

CASE 3.—A man, aged 36, the head of a family, and in good standing in the community, was referred by his dentist, who had been treating his gums without satisfactory results but knew that the patient had syphilis.

I believe that there are other dentists who do not know that it is useless to treat patients in this condition, and thus a great deal of the patient's time and money are expended without compensating benefit.

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C. N. JOHNSON, Editor

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Editorial

THE UNITED STATES PUBLIC HEALTH SERVICE

The probabilities are that not one dentist in a hundred knows all that he should know about the United States Public Health Service. It has a really remarkable history dating back more than a century and a quarter. It had its origin in the Old Marine Hospital Service, which was authorized by Congress in 1798. The first marine hospital was erected in 1800 at Norfolk, Va.; and from time to time, other hospitals were built as needed. There are now in operation twenty-five hospitals, with a bed capacity ranging from 50 to 500 each, and 126 relief stations.

The evolution of public health functions from such a service was along natural lines. The medical officers, in providing care for the American Merchant Marine, were often the first physicians to diagnose such diseases as cholera, yellow fever, smallpox and the like, which were being imported into the United States. In 1878, Congress authorized the use of the Marine Hospital

Service as the Federal Health Service, and empowered it to cooperate with state and local health authorities in the control of disease.

In 1902, Congress changed its name to the "Public Health and Marine Hospital Service" and again, in 1912, to its present name "The United States Public Health Service."

It was in 1902 that the Division of Scientific Research was created by act of Congress, and, during the same year, the Hygienic Laboratory was started. This laboratory has grown rapidly, until it now stands as one of the foremost research institutions in the world. It contains approximately 50,000 square feet of space, and is most excellently equipped for carrying on pathologic, zoologic, pharmacologic, bacteriologic, chemical and physiologic work. Its achievements would fill a volume. A visit to this institution will well repay any professional man for a trip to Washington. Its purpose is to investigate the diseases of man, and, at present, researches are being carried on in tuberculosis, influenza, pneumonia, anthrax, botulinus poisoning, hookworm, leprosy, malaria, meningitis, pellagra, plague, trachoma, typhoid fever, child hygiene, industrial hygiene, excreta disposal and stream pollution. At once, the question must naturally arise as to why dental diseases—the most prevalent of all human ailments—are not being investigated. And the simple answer is that no sufficiently authoritative request has ever been made to the service that this be done.

As just intimated, it is doubtful that more than one per cent of the dentists are really informed as to the United States Public Health Service, and the object of this article is to rouse interest in this important branch of our Government activities.

Dentists were taken into the Service in 1918, and there are at present between thirty and forty men in it, with C. T. Messner as Chief of Dental Service—to whom we are indebted for most of the information contained herein. It was the pleasure of the editor to visit the laboratory of the Service in October, 1927, and he was so impressed with what he saw that he felt a message should be carried to our members.

The United States Public Health Service is a bureau in the Treasury Department. It is headed by the Surgeon General (Dr. H. S. Cumming), whose sympathetic interest in dental problems is well known. Since the admission of dentists, no legislation has been passed to place them on the same footing as the regular medical officers. The dentists all serve under commissions as reserve officers of the United States Public Health Service. While they receive the same pay and rank as the regular officers of the Medical Corps of the United States Public Health Service, or officers of the Army and Navy and Coast Guard, they do not have a regular status, and would not, in case of accident or disease incident to their work, receive the protection of regular officers as far as retirement is concerned. The Service is mindful of this fact and, for several years, has been trying to get legislation passed to correct this condition.

Last year, a bill, H. R. 10125, was introduced by Congressman James S. Parker, of New York, chairman of the Committee on Interstate and Foreign Commerce, before which committee all United States Public Health Service legislation is referred for hearings. Hearings on this bill were held on Feb. 24 and 25, 1927, just before Congress adjourned, and though the hearings were very favorable, no report was made, owing to the rush incident to the closing days of Congress. It is to this bill that especial attention is hereby directed. It will be before the House at the present session, and the active interest of every member of the American Dental Association is solicited.

It has the unqualified endorsement of the legislative committee of our organization. It has the active support of the Surgeon General, and of every man who is interested in public health. All it needs is the enthusiastic endorsement of all right thinking men, and the plea is here made for our members in all sections of the country to write their Congressmen at once, urging them to support this measure.

If this bill becomes a law, it will throw open all of the great facilities of an old and wonderful organization for the advancement of the dental health of our nation. At the request of

the American Dental Association, the Surgeon General of the United States Public Health Service requested the Bureau of the Budget and Congress for an increase of $25,000 in its appropriation to start this work in anticipation of the passage of the legislation at the present session of Congress.

What the dental profession must do is to get behind this legislation in a wholehearted way and show Congress that dentists are alive to the best interests of the people as they concern the control and prevention of dental disease. We as a profession must reach out and gain contact with every possible agency which has for its object the alleviation of human suffering, and the present opportunity is one of the most propitious that has ever come to us for helpful and constructive achievement.

A BLOT ON OUR ESCUTCHEON

Attention has frequently been called to a serious dereliction of duty on the part of some members of our profession. The charge has again and again been made that, in our efforts to stem the tide of dental disease by advocating early attention to the teeth of children, we are thwarted at the very threshold of our endeavor by lack of cooperation among dentists themselves.

The facts are these: We teach the lay public by lectures and in our literature that, in order to control and prevent dental disorders, it is necessary for the closest attention to be given the care of children's teeth. Parents are naturally impressed with this kind of instruction, and accordingly they take their children to a dentist—with what result? Too frequently, they encounter a marked indifference on the part of the dentist, and, in many instances, a pointed refusal to do anything for the child on the plea that the deciduous teeth are unworthy of attention because of their early loss and replacement by the permanent set. How pernicious is this kind of propaganda can only be realized by those who have given close study to the significance of the deciduous teeth in the whole dental and health scheme; and the sole

inference is that the men who take this attitude with children either have not read our literature sufficiently to be informed on the question, or else they are so indifferent to their duty that they are willing to follow their own inclination in the matter rather than to face facts and meet the situation fairly and honestly.

This tendency on the part of some dentists has stirred our profession to action on various occasions, notably the adoption by the Massachusetts Dental Hygiene Council in March, 1926, of the following resolutions:

WHEREAS, Up to the present, the attention of dentistry has been centered mainly on the work of restoring lost dental tissue, and

WHEREAS, The only hope of real progress lies in the prevention or early control of dental disease, and

WHEREAS, Prevention, to be effective, must be applied early in the life of the individual, and early in the life of the tooth; be it

Resolved, That dental service must begin early, and be systematic and periodic in order to obtain the maximum of prevention with the minimum of operative work, and to properly educate the child in habits of oral hygiene; and be it

Resolved, That in the aim to attain prevention of systemic and dental disease

(a) No defect is too slight to receive definite attention.

(b) The temporary teeth should receive as much care as the permanent ones in order to promote the proper development of the jaws and head, and to maintain function.

(c) Particular care and attention should be given to developmental pits and fissures, whether occurring in temporary or permanent teeth, or whether decay is or is not present; and be it

Resolved, That the Dental Hygiene Council of Massachusetts declares for the principles and practice of children's dentistry, and maintains that the most effective dentistry that can be done for any individual is the service rendered between the second and fourteenth years of age; and be it

Resolved, That this Council calls upon all dentists to uphold these fundamental principles, and to do everything possible to promote the practice of children's dentistry by professional and public education, and in public and private practice.

Of significance in this connection is the fact that among the organizations that have adopted these resolutions are the following: F. D. I. Commission on Hygiene; American Dental Association; American Society of Orthodontists; Canadian Den-

tal Association; Pacific Coast Dental Conference, consisting of the following societies, Washington, Oregon, California, Idaho, Montana, Utah, Nevada and British Columbia; the following state societies, California, Connecticut, Colorado, Idaho, Illinois, Massachusetts, Montana, Nevada, New York, Ohio, Oregon, Pennsylvania, Tennessee, Texas, and Utah; Tufts Dental Alumni; American Academy of Dental Science; New York Academy of Dentistry; First District Dental Society of New York; Second District Dental Society of New York; Oral Hygiene Commission of Greater New York; Boston Society for Dental Improvement, and Greater Boston Dental Society.

With such an array as this in favor of child dentistry, it would seem inconceivable that any indifference should still exist on the part of members of our profession in a matter of such vital importance; and yet we are confronted with some rather startling evidence from a source entirely outside the profession that there is still laxity of duty in our ranks. Oct. 22, 1927, Mrs. A. H. Reeve, president of the National Congress of Parents and Teachers, addressed the following letter to Dr. John M. Dodson of the American Medical Association:

Dr. John M. Dodson,
American Medical Association,
535 North Dearborn Street,
Chicago, Illinois.

My dear Dr. Dodson:

In connection with the summer round-up of the children, in which you have for the past two years been so interested, both personally and as representing the American Medical Association, I am sending you an item of information in the hope that you may be able to secure attention to it from the people most concerned.

In the returns from forty-four states in which our local associations have been conducting the round-up, examining the children of pre-school age for remediable defects before the opening of the school year, we have, with increasing frequency, expressions of regret from the association that their percentages are low, because the local dentists have refused to fill the first teeth of these little pre-school children, saying they will fall out at any rate, and it is not worth while to bother with them.

As in the summary of percentages each dental cavity is counted one defect, this has had very serious results, and it would seem that some action might be taken which would send to particularly the rural and small town districts a call to the dental fraternity to mend the error of their way.

Hoping that you may be able to do something for us in this direction, believe me,

Sincerely yours,

(Signed) MARGARETTA WILLIS REEVE
Mrs. A. H. Reeve, *President*, National Congress of Parents and Teachers.

When the leaders of other organizations make so pronounced a declaration on this question, it is time that every thinking man in dentistry should take to heart the seriousness of the present situation, and should exert every atom of his energy to break down the inertia of the rank and file of our members. If we fail to do this, we fail in one of the fundamental obligations of our profession; and let it be said on behalf of dentistry that, in all the years of its existence, it has never yet fallen quite so low as to remain renegade to its bounden duty when that duty was made sufficiently manifest. We trust that, in the near future, the profession will be found 100 per cent for the preservation of the teeth of children, and thus redeem itself in the eyes of all of those who are laboring with so much solicitation for the betterment of the race.

CLARENCE JONES GRIEVES, M.A., D.D.S., F.A.C.D.

(1868-1927)

BY HARRY E. KELSEY, D.D.S., Baltimore, Maryland

Dr. Grieves was born in Wilmington, Del., Oct. 23, 1868. His family came to Baltimore about 1881, where he resided until his death, which occurred, Friday, Nov. 4, 1927. He is survived by his widow, Hannah Ramsey Grieves, and a son, Edward W. R. Grieves.

Dr. Grieves received his education in the public schools of Wilmington and Baltimore and graduated in one of the first classes of the Polytechnic Institute. He entered the University of Maryland, Dental Department, graduating in the class of 1888. He was immediately appointed assistant demonstrator in operative dentistry, a position which he held until 1892, when he was made assistant professor in crown and bridge work, holding this position until 1906. He was then called to the Baltimore College of Dental Surgery, to take a professorship in comparative anatomy and histology, and he remained there in that capacity until he

CLARENCE J. GRIEVES, M.A., D.D.S., F.A.C.D.
(1868-1927)

resigned to enter the service of the United States, in 1917. In 1913, through the efforts of Dr. Grieves, a dental clinic was established at the Johns Hopkins Hospital and he was made chief of staff, only resigning from that position about 1925, when his health made it impossible for him to give it further attention.

In 1917 and 1918, Dr. Grieves served as lieutenant in the Naval Reserve, being special instructor in the Dental Corps and dental consultant in the hospital at Great Lakes Training Station. He was also instructor in the Army and Navy Dental School in Washington, and lecturer in the Dental Department of the Naval Medical School. He became a fellow of the American College of Dentists at the time of its organization, being one of the charter members.

Among the honorary distinctions which were bestowed on Dr. Grieves was the master of arts degree, awarded by the University of Michigan in 1921. In 1922, the Connecticut State Dental Association awarded him the Newell Sill Jenkins medal. Two other medals were conferred on him, the Callahan medal, by the Ohio State Dental Society, and the Jarvie medal, by the New York State Dental Society.

In 1925, the Maryland State Association established a library in his name, and as a nucleus, Dr. Grieves gave his own personal library. This has been augmented in various ways till it is now a valuable library.

Dr. Grieves began his career of study and investigation of dental problems almost at the time of his graduation from the University of Maryland Dental Department in 1888, and never ceased to be one of the most strenuous workers along these lines. To recount all his activities would be impossible.

Among them were the following: A study of metals for orthodontic appliances; the question of focal infection; endocrinology in its relation to the teeth; and last his study of diet.

His private life was exemplary in every way. He had a generous and hospitable nature and discharged every obligation to his family and society with the utmost fidelity. He was never happier than when sharing his delightful home and home-life with his friends. He was cut off suddenly in the flower of his success, but his example and work will continue to live and bear fruit.

A bibliography of the writings of Dr. Grieves would be too long to append here, but he wrote extensively on many subjects.

DONALD M. GRAHAM, D.D.S.

(1874-1927)

Donald M. Graham was born on a farm near St. Thomas, Ontario, and died at Grace Hospital, Detroit, Monday, Oct. 31, 1927, at the age of 53.

Dr. Graham came to Michigan as a young man. After teaching school for a time, he entered the dental department of the Detroit College of Medicine, from which he was gradauted in 1898, taking a medical degree from the same college in 1903. He was engaged in the general practice of dentistry until about 1912, since which time he has given his attention exclusively to the practice of oral surgery, teaching that subject for a number of years in the college from which he graduated.

Dr. Graham was married, Nov. 30, 1910, to Miss Mabel H. Johnston of Detroit, who, with their two sons, Billy and Bobby, survives.

He served as president of the Michigan State Dental Society, and the First District Dental Society. He was a member of the American Dental Association, Michigan State Dental Society, First District Dental Society, the Wayne County Medical Society, Xi Psi Phi Fraternity, and the First Presbyterian Church. He was also a member of the following clubs; Detroit Athletic Club, Detroit Golf Club, Grosse Isle Golf and Country Club and Lions Club and for a number of years served on the staff of both Harper and Providence Hospitals. He

was a Mason, having belonged to the Michigan Sovereign Consistory, and the Corinthian Lodge.

Doctor Graham was a quiet, retiring type of individual, who enjoyed the deep regard and loyal friendship of a great number of men. His funeral was largely attended by many friends both in and out of the profession.

MARK E. VANCE, D.D.S.

Dr. Vance died, Nov. 18, 1927, after a long illness. He was graduated from the Chicago College of Dental Surgery in the Class of 1900. He practiced at Lincoln, Nebraska, up to the time of his illness, and was one of the outstanding men of his state. He had held all the offices in the gift of his profession, and was past supreme grandmaster of Delta Sigma Delta Fraternity, in which organization he was very active.

He leaves a devoted wife and daughter, to whom the sympathy of the profession goes out.

J. M. WHITNEY, D.D.S.

Dr. J. M. Whitney, pioneer dentist of Honolulu, T. H., died Nov. 17, 1927. At the time of going to press, we have no further particulars.

YOU CAN DO IT

The disposition to hide behind the subterfuge that it can't be done is accountable for much of the lack of accomplishment in the world, and every man should resolutely winnow from his consciousness the notion that there are so many things that are impossible. Most of the great achievements have been hedged about by the negation of some one who has tried to throw cold water on the plan. Had it not been for the fact that far-seeing, resolute and resourceful men had ridden rough shod over the ideas of the obstructionists, there would be little of note to record in human progress.

The theory that it can be done, and that you can do it, is calculated to contribute more to real advancement than any policy which contains within it the element of doubt. If any problem arises which seems to present an insurmountable barrier, and you are convinced that it is for the betterment of mankind, just assume the attitude that there is a way to accomplish it, and grapple with it at once, with the conviction that you can do it. Waiting for something to turn up is no more effective than it was in the days of Micawber, and it will get people no farther than it did him.

BOOK REVIEWS

A TEXTBOOK OF EXODONTIA, ORAL SURGERY AND ANESTHESIA. By Leo Winter, D.D.S., Professor of Oral Surgery, New York University, College of Dentistry; Oral Surgeon, Flower Hospital; Lecturer in Oral Surgery, New York Homeopathic Medical School; Oral Surgeon, Dental Clinic Association for Improving Conditions of Poor; Visiting Dental Surgeon, New York Foundling Hospital; Visiting Dental Surgeon, Harlem Hospital, Bellevue and Allied Hospitals, New York City. With 329 illustrations. Pp. 364. Price $7.50. Published by The C. V. Mosby Company, St. Louis, Mo.

The book opens with a chapter on "General Anesthesia" by an authority, James Taylor Gwathmey, M.D., who devotes forty-seven pages to this subject. This chapter is well worth careful study. Then Dr. Winter takes up the consideration of local anesthesia and goes into the subject in great detail. Nearly half the book is devoted to these two topics as a good background for the surgical part of the work. The technical processes in the removal of the different teeth are well described and illustrated; in fact, the illustrative features of the work are most profuse and unusually good. They add wonderfully to the effectiveness of the text. A slight suggestion is hereby made for future editions. The use of such terms as "canine" for cuspid, and "premolar" for bicuspid is hardly warranted at this stage in the revision and development of our nomenclature, and a book so excellent as this should not contain them.

The book is well printed on good paper and is a credit to the publishers.

THE POLARIMETER. A Lecture on the Theory and Practice of Polarimetry. By Vivian T. Saunders, M.A., Fellow of the Physical Society of London. Pp. 29. Price 1s, 6d, net. Published by Adam Hilger, Ltd., London, England.

This lecture is illustrated by fifteen slides, and is intended to survey briefly the history, development and industrial applications of the polarimeter. It is quite technical and therefore is of particular interest to those intimately concerned with this subject.

INDEX OF THE PERIODICAL DENTAL LITERATURE, 1891-1895. Published in the English language. Compiled by Arthur D. Black, A.M., M.D., D.D.S., Sc.D., Dean of the Northwestern Dental School. Published by the Dental Index Bureau, 381 Linwood Ave., Buffalo, New York.

This volume is the sixth in the well known series, of which there have already appeared 1839-1875; 1876-1885; 1886-1890; 1891-1895; 1911-1915 and 1916-1920. The following volumes are in the course of preparation: 1896-1900; 1901-1905; 1906-1910; and 1921-1925.

The present volume includes sixty-four publications in England, Canada and the United States, and is a most comprehensive work.

Among other extremely interesting articles is the one by Dr. L. Pierce

Anthony on "The Editorial Influence Upon Dental Literature," 1839-1890. Sketches are given of Drs. Harris, Taylor, J. De Haven White, Taft, McQuillen, J. W. White, Watt, Chase, Gorgas, Welch, Clark, Catching, Barrett, and Harlan. This makes most interesting reading.

This volume is typical of the volumes already issued. It places before the reader in orderly form the titles of all the articles appearing in our periodical publications for the time specified, and as a record of the literary output of dentistry it is invaluable. Dr. Black has placed the profession under the deepest obligation to him in preparing this index, and when the final volume is completed, the work will stand out as one of the most distinctive pieces of literary effort ever recorded in dentistry.

The price of the book is $6.00 to points in the United States and Canada, and $6.50 to other points. Considering the vast amount of labor involved and the general character of the work, this price is remarkably low. It can be obtained by writing the secretary, Dr. Abram Hoffman, 381 Linwood Ave., Buffalo, N. Y.

DENTAL PROSTHETIC MECHANICS. By D. M. Shaw, Curator of the Prosthetic Laboratories, Royal Dental Hospital of London. 175 illustrations. Pp. 373. Price $7.50. London: Edward Arnold & Co.

This book was written primarily for the student. The author first takes up a study of the normal forms and arrangement of the natural teeth, and then enters on a discussion of the technic of constructing artificial dentures—the impression, the bite, setting up artificial teeth, etc. He then considers the various bases on which teeth may be mounted, rubber, metal, continuous gum, etc. There is also a chapter on partial dentures, and one on the construction of appliances for cleft palate cases.

The book is well illustrated and well printed and will prove a real aid to the dental student.

THE STRUCTURE OF THE HUMAN TEETH. By May Mellanby. London: John Bale, Sons & Danielsson.

This pamphlet is a reprint from *The British Dental Journal*. It consists of fifteen pages and contains fourteen illustrative plates, which are most excellent. This study was evidently made for the most part to demonstrate the various defects in tooth development, and it is a very worthy presentation along this line. It must be seen and studied to be appreciated, and the thanks of the profession are due the author. Every one interested in the subject should have a copy of this pamphlet.

DEPARTMENT OF DENTAL HEALTH EDUCATION

WHAT THE DENTAL PROFESSION OWES TO THE PUBLIC*

By C. N. JOHNSON, Chicago, Illinois

ONE of the chief glories of professional life relates to the fact that, from time immemorial, it has always been taken for granted that professional men should be willing to devote a goodly part of their time and energy to service for the poor and needy without a thought of recompense. The willingness to do this on the part of professional men has stamped them as different from other men in their ethical relations with their fellowmen. It is never expected that the merchant will hand out commodities to people for nothing, no matter how poor they may be. No one looks for such a thing, and yet the world accepts the fact quite naturally that professional men must minister to the needs of suffering humanity regardless of their ability to pay; and, in the case of the very poor, it is taken for granted that the service is rendered for nothing. Whether this attitude of mind, and the practical application of it, is just to the professional man or not, the fact remains that it is established by tradition and that this tradition has given to professional men a status in the estimate of the world which has placed them in a class by themselves. There is no question that this estimate is deserved because of the self-sacrifice which has become, by common heritage, part and parcel of every professional man's life.

Therefore, the full conception of what the dental profession owes to the public can never be realized without a clear recognition of the heritage which was ours when we became a profession. We must follow in the footsteps of the older professions if we aspire to full professional stature in the eyes of the world, and we must take a chapter from the book of medicine and be willing to do what medicine has done for the welfare of our fellowmen. To this end, we must never hesitate when the occasion arises to devote part of our time to the public good, and the only question we have to decide is what is the public good.

Assuredly, as far as dentistry is concerned, the greatest public good is the limitation and the eventual prevention of dental disease. But this problem is more easily stated than solved. First, we must learn how to prevent dental

*Read before the District of Columbia Dental Society, Oct. 11, 1927.

disease, and while we have made appreciable progress in this respect, our methods are yet immature, and the results more or less uncertain.

It is true that, if a growing family of children is placed under the care of a conscientious dentist, and this family lives under ordinarily good hygienic and dietetic conditions, there is no question that the children may be brought to adult life with good serviceable sets of teeth; but this requires cooperation by the family and the dentist. It means knowledge on the part of the dentist as to what to do, and it means education of the family. And this much may be said: dentists are gaining more knowledge every day, and the people are becoming better educated. Recently, an observant gentleman made this remark: "I have just returned from a summer camp in the north woods where I met many young people on a vacation, and I must say that the condition of the teeth of the coming generation is a great compliment to the dental profession. We saw no such mouths in the young people of my day." And this fact must impress every one of adult or later life, if they are sufficiently observant.

But this relates only to certain classes of society, leaving practically untouched the great mass of our people who, more than any one else, need a new light as to the significance of the teeth as factors in health and disease.

And it is to this great mass that the chief duty of the dentist relates as far as his obligation to the public is concerned. How shall they be educated as to the significance of the teeth, and how shall they be cared for after they have learned the need of it? With the aggregate of ignorance which it must be admitted exists today, it may seem paradoxical to affirm that the education of the public has gone faster than the ability or disposition of the dentist to meet the situation and render the service that is demanded of him. But this is an incontrovertible fact. Instances are common all over this country in which people have been taught that it is necessary to give early attention to the teeth of their children, only to be confronted with lack of cooperation or a pronounced indifference when they apply to the dentist for care of these teeth. This is confusing to the parent; often it is embarrassing, and always it is disappointing. If the dental profession is to do its full duty to the public, it must first keep faith with the patients who apply for service, and it must recognize the same obligation to children as it does to adults.

Doubtless, many men find it difficult and even disagreeable to work for children. Temperamentally, they "don't want to bother with them." It is needless to argue with this type of man; it is useless to say to him that the greatest joy of professional life comes from working for children, that nothing relieves the tedium of a long hard day at the chair like the prattle of a little child or the chatter of an older one, that children bring to the office a brightness and cheer which can enter it in no other way, and that the loyalty of a child is one of the most precious of all professional possessions. Men who are temperamentally unsuited to care for children can never be made to minister to them successfully, but such men should at least assume an honest attitude in the matter and refer children to some one who wishes to work for them, instead of trying to cloak

their indifference by telling the parents that children's teeth are not amenable to treatment or that it is ill advised to endeavor to treat them because of their inevitable early loss. To say that a deciduous tooth is not to be cared for because it must be lost in a year or two is either a species of cowardly shirking, or it is an indication of failure to recognize the importance of these teeth to the health and comfort of the child or to the integrity of the permanent teeth. The most significant thing in dental practice today, aside from the prevention of disease, is the proper care of children's teeth, and it has been only along that line that dentistry has been enabled to make such a demonstration as to call forth the exclamation of admiration just quoted from a lay observer. The sole means by which we can maintain and advance our status in the public mind is to preserve inviolate an attitude of conscientious endeavor toward the solution of every problem presented to us by our patients; and we must not shirk the seemingly disagreeable kind of service merely because we would prefer to do some other kind. The reputation of medicine and dentistry was not made by shirking duty of any kind, and we must not expect to preserve it by that means.

There is one paramount duty which the profession owes to the public in its function of private practitioner. Every dentist conducting a practice should so plan a campaign of preservation that the teeth of one generation shall be better than those of the generation preceding it. There is nothing more gratifying in private practice than to bring children up to young manhood and womanhood with a fine set of teeth at an age when their parents had lost many or all of their teeth and were suffering the consequences of such loss. This kind of service carried on generation after generation, even if we do not discover a sovereign remedy for dental decay, as we fondly hope to do, will result in a vastly better condition of the teeth of the people as a whole, a fact already amply demonstrated in the teeth of the American youth of the day. There is no country on the civilized globe where the people, living under the same environment as those of America, can show so favorable a condition of the teeth of the youth as can this country. This has repeatedly been observed. It was remarked on many occasions by writers during the World War that, when the American soldiers landed in Europe, the most conspicuous difference between them and the soldiers of European countries was the uniform excellence of their teeth. Europeans noticed it and remarked it everywhere our boys went.

This was due only to one thing: the better education of the American people as to the significance and care of the teeth, and the better attention to the patient by the dentists of America. This is said in no spirit of provincial boastfulness, nor to arrogate to American dentists any superior virtue or skill over those of other lands; but the fact stands out in all insistence and has been so generally noted that it cannot be gainsaid. Walk the streets of an average American city today, and note the teeth of the people. It is rare to find individuals toothless in the ordinary walks of life; nor is it common even to see people with discolored or neglected teeth among the American population. And the proportion of artificial to natural teeth was gradually assuming a diminishing pro rata until this recent senseless craze and rage against the nat-

ural teeth swept the medical and dental professions off their feet, and resulted in the slaughter of countless thousands of useful and altogether harmless natural teeth. This is not the place to enter on a discussion of this question, but when the final chapter is some day written on the recent tendencies of medicine and dentistry in their attitude toward the subject of focal infection in its relation to pulpless teeth, it will record one of the saddest experiences of our professional history, and one for which we shall perforce be led to blush.

If it is true, then, that the teeth of the American people are today in better condition than the teeth of the people of other civilized countries, it cannot be attributed to our modes of living. We are told constantly that our modes of living are very bad, and this would seem to be borne out by the fact that there is as great an incidence to dental decay as there ever was, at least with the rank and file of the people. The reason, as has been said, is due to the care given the teeth of our people by the dental profession.

It is true that we may see in these mouths of the multitude some very appalling specimens of the dental art. We may see gold crowns on incisors reflecting back the gleams of the electric street-lights; we may see all the canons of art violated with the utmost abandon, and we may recoil a bit when we see it; but we must remember this, that, bad as it is, it at least gives evidence that some attempt is being made to combat the ravages of disease, and that a glaring bit of gold is preferable in appearance to a decayed and snaggly tooth.

One thing about the incidence of caries of the teeth may be mentioned parenthetically. While, as previously remarked, the incidence may be as great with the rank and file of the people, it is undeniable that there is a reduced incidence among a certain class. With people who are seriously studying better modes of living, who are giving intelligent attention to diet and to the principles of hygiene, there is a pronounced, and, in some cases, almost a spectacular, reduction in the tendency to decay of the teeth. We note this particularly among the children of some of our families in which greater intelligence is used in the rearing of children and expectant mothers live a more rational life. In many of these cases, we see the children retain their deciduous teeth without a blemish till they drop out in the natural order of things, and are succeeded by permanent teeth in equally good condition. All these cases need is a periodical dental inspection and so-called prophylaxis to detect any possible development of trouble and check it at once. It will doubtless be stated that these cases are rare, but there is no question that they are rapidly on the increase among the class of people mentioned, and they give to us the most tangible glimpse of what the future holds in the way of preventing dental disease.

But, in considering the question as to what the profession owes to the public, it is quite natural to have in mind the obligation due to the poor by dentists in the way of free service. This, of course, relates particularly to the care of the children in our schools and various charitable institutions; in short, the care of the dependents of our nation. And, in this very laudable work, our profession must reckon with its duty in no uncertain terms. We must

take our place valiantly alongside our medical brothers in every worthy effort to mitigate the evils of our less fortunate fellowman. We must give of our time—in reasonable amount—to philanthropic work, whether at the chair in our own office, or at public clinics, or in organization or committee work, or in lectures and other educational effort. Every dentist must be made to feel that he has a very important function as a public servant, and that he must be ready at all times to cooperate with other agencies in any movement having for its object the betterment of the masses.

This does not imply that a dentist is called on to leave his office and give as much of his time to operating in public clinics as a medical man does. The cases are different. The office hours of a physician are never so long as are those of a dentist, and the former can more readily arrange for clinic hours without sacrifice than can the latter. Not only this: the physician is benefited by his association with a public clinic in a way that the dentist never is. The clinical experience is, of course, valuable to both, but, in the case of the physician, there is a connection which later brings practice to his office in a way that it never does to the dentist. On account of the hardship on the dentist, no public dental clinic can ever be maintained for any length of time on volunteer service. It has been tried time after time but has never resulted in permanent success. And this is not due to a lack of philanthropic spirit on the part of dentists but to the fact that the nature of the work is such that it makes too great a sacrifice of time and effort for any man to follow it who has to earn his living. But dentists must be willing to sacrifice a part of their time; and this is particularly true in the beginning of any public dental clinic. Movements of this kind must first be fostered either wholly by the profession, or at least by private enterprise, and dentists must stand in the breach till the movement has demonstrated its value.

Until very recently, it was difficult to impress our public officials with the necessity of doing dental work for dependent children. In the past, in almost every instance, if a clinic was started in a school or any public institution, it was necessary to support it by private enterprise. Not till public opinion had forced our officials to act did they ever appropriate public funds for this purpose, and probably this is not to be wondered at, in view of the ready criticism meted out to officials for public expenditures. But some of us who have been interested in the work have not been able to escape the feeling that, in too many instances, our officials have been supinely purblind in denying aid to a movement which is so manifestly for the welfare of the people as this, while they made appropriations for things of questionable character. The more one has to do with philanthropic efforts of this kind, the more one is impressed with the fact that, while we are sometimes prone to boast of our civilization, humanity is yet, after all, something of a mess.

With all the enlightenment which we like to think that we possess, the one outstanding need of the day in this, as in every other effort at improving the race, is better education on the part of the people to be benefited. The best thing that our public clinics do is to educate those who come to them as

to the importance of mouth hygiene and the means to maintain it. If the operators in our institutional and industrial dental clinics live up to their highest opportunities, they will spread the gospel of prevention with every patient who comes under their care, and the good they will do in this way will far outweigh all they achieve in the way of operations on the teeth or even in the relief of pain. Of course, the most insistent thing in all of our service is to relieve suffering. This is the first duty of the professional man. But next to this is the necessity of so instructing the patient that future suffering may be avoided. If the operators in our public clinics merely go on day after day, in a routine and perfunctory way, filling and extracting teeth for the people who come to them, they may be doing a creditable and legitimate service, but they are falling far short of their highest function as conservators of the welfare of the people.

And speaking of education, the most profitable education is that which teaches the people to take care of themselves; in other words, teaches our dependents to become independent. In all of our philanthropic work, we are in serious danger of doing a definite damage to those we serve by implanting in their minds the idea that the community or state owes them a living, or at least that part of a living embodied in free professional service. There is a possible demoralization in this, with which we must reckon. The moment any individual beyond the age of mere childhood reaches out the hand to accept something for nothing, that moment there begins in the individual a moral disintegration which may easily lead to mendicancy or something worse. The great need of the day is to teach individual responsibility—to teach every man that he must be responsible for his own welfare as far as he has the ability to secure it.

And it is just as bad ethics, and just as demoralizing, to have the state perform a service for the individual which the individual should perform for himself, as it is for the individual to do something which properly belongs to the state. I have the firmest conviction that, in this country, we have unwittingly done a definite damage to some of our citizens by too much paternalism. I have said elsewhere, and I repeat, that if I were mayor of a city, I would not permit a beggar on the streets. It is always demoralizing in the highest degree, and any city can better afford to provide some way whereby the needy may be enabled to support themselves than it can to have the sensibilities of its citizens outraged by so blatant a public display of mendicancy, or imposed on and fleeced of their money by a set of imposters, as most of our professional beggars are. It is well known that, in this fair land of ours, no one wants to see the innocent or needy suffer, and this fact has been seized on to promulgate the most outrageous exploitation that has ever been witnessed in any country. It seems difficult for our American people to distinguish between a legitimate and praiseworthy effort to aid the deserving poor, and a species of maudlin sentimentalism which does infinitely more harm than good. No wonder our wise and public-spirited philanthropists are more and more inclined to place a safeguard around their benefactions, and are pursuing policies which some of our sentimentalists are complaining of as being "hard-boiled."

Indiscriminate charity has done as much harm as good in this country, and the time has come for people to wake up to this fact.

Of course, this may be said to have little to do with dispensing dental service to the children of the poor; and yet there is a more direct application than those who are not familiar with the work might imagine. It would be well if it were possible to have a rule in all of our public clinics to follow the plan of the Forsyth and Eastman institutions in making a nominal charge for each operation. It would be advisable for the moral effect, if such a thing could be done. That those in charge of the work are beginning to recognize this fact is indicated by a remark quoted by Dr. William R. Wright of Jackson, Miss., as coming from the chairman of the lay education committee in a large northern city: "Free work fails to impress the people in the right way." Free work never did impress any one with correct motives, and as far as the other kind are concerned—the leeches, and sponges—it is time they were taught the lesson of their responsibility.

To sum up the duty of our profession to the public in a single sentence: Let the attitude of the dentist to his patients, whether in private practice or in public service, be such as to most surely safeguard not only their physical well-being, but also their moral and mental responsibility. Nothing short of this should be dignified by the name of professional service; and the fulfilment of all of this may well constitute the highest expression of one man's bounden duty to another.

DENTAL CLINIC POLICY*

By CLARE TERWILLIGER, B.A., New York City

THERE are good plans and bad plans and no plans at all. A dental clinic is guided by a well worked out program or a poor program, or it "just grows," like Topsy. When a room has been equipped with a dental chair, sterilizing outfit, instruments and cabinets, and a dentist has been engaged to take care of patients, have you a dental clinic until you have answered these questions, "What are we going to do?" and "How are we going to do it?" When those questions have been answered satisfactorily, taking into consideration the community to be served, the size and type of the institution in which the clinic is installed, the budget to be spent and the personnel to man the clinic, you have a policy, a plan, a program, or whatever means to you a course of action.

It should not be necessary to give reasons for having a policy or plan. However, many clinics have gone out of existence for lack of one. There is one well equipped clinic in a large hospital in one of the large cities of this country where they have no pa-

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Sixty-Ninth Annual Session of the American Dental Association, Detroit, Mich., Oct. 25, 1927.

tients. The managment cannot understand why. They have no plan.

Compare the effect of planning in business. A few years ago, you could not look at a bill board without seeing an appeal to the housewife to buy some kind of flour. Have you noticed such advertisements lately? Several millions of dollars went into such campaigns because mothers always made bread for their families. No survey of the field was considered necessary. They just advertised with no particular plan in mind. Finally, someone discovered that bread was not being made at home. Millions of dollars were being spent to advertise flour to millions of housewives, and about 1,700 bakeries throughout the country were making most of the bread which was consumed.

A large concern which manufacturers hardware planned a campaign of advertising for a new product. The campaign was centered in a certain city where the need for that particular product was apparent. The newspapers and popular magizines carried attractive ads. People flooded to the stores to buy the wonderful new product, but the company had failed to deliver the goods to the retailers when the advertising was released. A similar product made by a rival firm was all bought up as a result of the demand created by the firm's advertising. Because of the incompleteness of the plan, the money that went into that campaign was lost.

A few years ago, the rival paint manufacturers found that the amount of paint sold throughout the country remained the same each year over a period of years. One year, one company would profit by greater sales than the rest, but the same amount had to be divided each year. Finally, the heads of the companies got together, admitted the business was at a standstill, and decided on a scheme of cooperative advertising to increase the sales of paint. They planned in detail a country wide campaign with the slogan "Save the Surface and You Save All." The result, after nine years, is a 100 per cent increase in the use of paint. Business has increased and the public has been taught the importance of conserving valuable property by paying attention to the condition of surfaces early and often. There is an analogy to conservation of tooth surfaces, but we are talking about plans and not about technical dentistry.

A good plan is necessary to obtain results. Now, what goes into making up a plan? The needs of the community, the type of institution in which the dental service is set up and the purpose of that institution.

The main points that have to be decided are the purpose of the program; that is, whether it is to be preventive or curative; the services to be rendered; who is to render them, and the patients to be treated. These elements differ according to the organizations offering the service. Take, for example, the hospital. Its problem is obviously a curative one. Shall it provide all the services taught in dental college, or shall a line be drawn, and, if so, where? The amount of work to be done can be measured by the number of new patients admitted. A hospital with 300 beds may expect from fifteen to twenty new cases daily. If the hospital has an outpatient department, the number of admissions will vary according to the location and the economic status of the population. The question of personnel is dependent on the amount of service needed. Volunteer dentists on the hospital staff may be able to do the work.

If a large proportion of that service is routine work, such as examinations, prophylaxis and roentgen-ray, and pathologic laboratory work, a dental intern is unquestionably valuable. If the institution is large, the use of a hygienist is important to relieve the dentists of the burden of surface cleanings, which are so necessary.

The problem of a school system is to decide whether the mouth health activities shall be educational or curative. If the work is to be educational and the children are required to submit a certificate stating that their mouths are in perfect condition, it is necessary to know whether the parents can afford to send their children to the office of private dentists. If they cannot, are the neighborhood clinic facilities adequate?

Different elements enter into consideration in making plans for dental clinics to be operated by a department of health, a board of education, an industrial firm, a social agency, a health center, a detached dispensary, a hospital with or without an outpatient department attached. An entire paper might easily be devoted to each subject. The purpose, at this time, is not to outline a plan that you may take home and put in operation. It is to insist that, since people are becoming more enlightened concerning public health standards, the lack of planning and poor planning of the past will not suffice. There is something more to the establishment of a dental service than saying, "Let's have a dental clinic."

DISCUSSION

Regina David, Cleveland, Ohio: Suppose we have 400 children, anywhere from 4 to 16 years old, to take care of, and for a number of years we have done all the repair work found necessary, and now we wish to know whether we are doing the right thing—whether we ought not to start a new plan. What would your plan be—to be productive of more dentistry and less repair work?

Harold DeW. Cross, Boston, Mass.: It may be that we had more "nerve," or something of that sort, and were willing to meet the situation which exists everywhere, and met it in an unconditional manner instead of trying to do the impossible—take care of all the dentistry of this group of children from 4 to 16 years. If you try to do all the work that the older ones need, you will never get to the younger ones. That is what dentistry has been doing for over fifty years, and this has never made for progress, never will and never can. In Boston, it would have taken 1,004 dentists who have worked from 16 down to 6 years of age, to get control of the condition of the 6-year-old child. We did not have the 1,004 dentists and did not know where to find them. With an average of from fifteen to sixteen working each year, we have been able to accomplish much, and have control of the situation at the present time. It is a little bit hard on the older children, but the dentists have been trying to perform miracles long enough. They have admitted their own limitations. If you have 1,000 dentists for a relatively small number of children, take care of all the children. If you are limited, as I believe every community is, begin with the young children and do all that they need, continuing each year. You will find it possible to continue the necessary work for that group, until they are 13 years of age, with a very small personnel of dentists and a large number of children; but if you attempt the care of 12-year-old children who have not had any dental care at 6 years of age, you need a large staff of dentists. The other way is easy, simple and reasonable, and only five years is required until our policy is worked out. We do not do modern dentistry in the nature of root canal work or even in the conservation of pulps. We extract, or put in a filling that is good for ten years. This procedure may not be the best thing in the world, but, so far, it is the only one that I have heard of that works. If anybody can suggest another that will work, I shall be glad to hear it.

C. Carroll Smith, Peoria, Ill.: I agree with Dr. Cross, but we need to bear in mind that the public school is an educational, not a charitable, institution. The clinics in con-

nection with public school dental health service, which we call dispensaries, are only incidental to the educational work, and are not the main factors in mouth hygiene activities in our schools. I do not believe that we should work with children up to 16 years of age in public school dental dispensaries. Dr. Cross is right in saying that this dispensary service should be confined to children of the lower grades. Only the simplest kind of service should be rendered; bearing in mind that the pupil must be taught to appreciate the service in such a way as to lead him to a contact with the dentist who is in the community to render such service, not as charity, but as a necessity to health, comfort, scholarship, and happiness. Hand in hand with this education of the child comes the education of the dentist; for the very simple service which the school dentist renders is only a stepping stone to remedial and reparative measures which the public school officials should not be expected to foster. This necessitates bringing into line for service our brother dentists in the community. They too must be educated to an appreciation of the privilege of serving school pupils who are unable to pay for service. They must be made to feel their responsibility in community dental health education, and should respond cheerfully and conscientiously to requests for service among the pupils who must be made physically fit, through clean mouth procedure, before they can qualify, through good scholarship, for good citizenship. In Peoria, our dentists respond beautifully to such calls, and they are glad to serve the pupil who needs service which cannot be rendered in the school dispensaries. As a result of this unselfish cooperation, the number of school children with appreciation of the importance of dental care has increased 60 per cent in the last ten years. As an adjunct to this, the inspection which is carried on in the older grades, together with the educational methods which are promulgated in all grades, ought to and does take care of the dental health problems of the older pupils, inspiring clean mouth habits and a personal touch with the family dentist. In the dental inspection, personal advice is given to each pupil, and a notice is sent home to the parent urging immediate attention to dental defects. As to the emergency cases, the extreme cases of suffering, the unusual reparative service demanding attention: if the school dentist is going to spend his time on these, he will keep on doing the same thing over and over again, repairing, treating, remedying, never getting anywhere, for one of such cases takes up the time of serving twenty pupils along preventive and educational lines. The public school is no place to carry on a general practice in dentistry. It is an educational institution. The local dentists are in practice to serve the community. I believe that, in these extreme cases, if the service cannot be secured through the parents because of lack of funds, we should try to convince the dentist of his responsibility for a certain amount of charitable service. It is an educational proposition all the way through. A school system that has only a dental clinic is not making much progress along dental health lines. There should be some kind of educational system either by lecture or class room methods. Dental inspection with follow-up work should also be carried on through the grades, in the kindergarten, and with the preschool age child. The clinic itself is not enough.

G. H. Wandel, Iowa City, Iowa: I think Dr. Cross has not given us as fully as he might the actual measures in regard to preventive treatment outside of prenatal treatment and the like, in regard to pits and fissures and methods of treating all these pits and fissures. I believe that is the secret of all your success at Forsyth, is it not, Dr. Cross?

Harold DeW. Cross, Boston, Mass.: The treatment is simple. It is our aim to see the children as soon after the eruption of each pair of teeth as possible. Of course this is more important with the permanent than with the deciduous teeth. We have not the same control over the preschool child as we have over the school child. We cut out all pits and fissures that can be discovered and insert fillings. It is easy and almost 100 per cent effective. In looking for pits and fissures, we use an explorer made of piano wire, with a very small obtuse angle, about an eighth inch long. Those explorers are used only twenty-five times before they are resharpened. The piano wire is straightened, repointed and rebent. That is merely a matter of economy. You would not need to use that kind of an explorer. I think many dentists attempt to find pits and fissures by drawing the explorer across the surfaces as one would in endeavoring to find out

whether or not the surface or filling was flush with the surface of the tooth. This method is not effective in disclosing pits and fissures. The explorer should be stiff enough to be pressed against the suspected tissue, and considerable pressure should be exerted. If in being raised, the explorer sticks as a pointed instrument sticks in a board, and snaps out, there is a defect present. It may be better to use a No. ½ round bur. It requires a good deal of pressure to cut a sound enamel surface. If the pressure permits the bur to cut into the enamel, it shows a defect. If there is no fissure, no harm is done to the tooth. Get the child at the right age, before there is a cavity, and make a careful examination; and if defects are found, cut them out and fill them. Do not say to the child or mother, "There is a little defect, but it is too early to fill it. Come back in a year or six months." They do not always come back. We do not, in my opinion, need to worry about putting in a filling unnecessarily. If it is well done, it will do no harm. All we need to do is to see that we do it sufficiently early and make it sufficiently extensive and do it well, and we are through with that particular tooth.

CHILDREN'S DENTISTRY*

By EDWARD F. SULLIVAN, D.M.D., Boston, Massachusetts

THE subject of children's dentistry is looked on by the foremost professional educators as the most important topic before the dental profession today. As fellows of the American Academy of Dental Science, you cannot view the distinct changes, advances and present-day problems of your profession without being vitally concerned. Dentistry has advanced from a dubious handicraft to a noble profession, recognizing and accepting its responsibility in the maintenance of general health.

The mouth is now considered as an integral part of the body, influencing, to a large degree, the general health.

While we are far from being able appreciably to prevent dental defect, we can, in the light of present-day knowledge, control the dire results, both local and general.

The more we study the situation in its entirety, the more we are convinced that it is primarily a problem of childhood. Our greatest opportunity is in education and early and systematic treatment—children's dentistry. What it is, why it has come and how it can be put into practice is my theme.

No attempt has been made to discuss here the etiology of dental caries. The technical aspects of this modern phase of dentistry have been purposely omitted. This paper deals largely with principles and policies, the logic of which you are to judge.

Andrew Carnegie, on one occasion, in a public address, said: "If you don't believe that we have progressed, just look back and see where we came from." Applying this suggestion to our profession in America, we become aware of the gigantic strides that have been made.

Dentistry's tremendous development has been unquestionably due to an imperative desire to better serve mankind. While its growth has been rapid and continuous, it has been well founded.

*Read before the American Academy of Dental Science, Nov. 3, 1927.

A brief, historical résumé shows three periods, each of which contributes to those which follow.

The first era finds dentistry an empiric handicraft, the outstanding feature of which is the courage, zeal and steadfastness to purpose manifested by those pioneer dentists. To them, we and all humanity are indebted.

The second epoch-making era, beginning about the middle of the nineteenth century, finds dentistry steadily gaining in position, through its tireless efforts to alleviate human suffering. Advancement of this era is most conspicuous along mechanical lines of achievement. Hundreds of instruments were invented: the foot engine and the automatic mallet, as well as vulcanized rubber, the rubber dam and improved filling materials, a more highly developed technic, etc. This mechanical era made invaluable contributions to dental posterity by facilitating operative procedures.

With the dawn of the twentieth century, dentistry, with its accumulation of wisdom and knowledge gained from the past, entered the present rapidly advancing scientific era. Miller's chemico-parasitic theory of 1885 had been proved and was generally accepted by this time. The acceptance of Miller's findings undoubtedly inaugurated this era of prolific investigation and research, resulting in the broadening of dentistry's scope of education and a greater appreciation of its responsibilities. A few years later, Miller called the attention of the profession to the influence of the mouth on the rest of the body. In spite of the semi-organized efforts to bring the medical profession to appreciate this relationship between mouth disease and systemic conditions, it was several years before the medical profession gave the matter serious consideration. The first of the medical profession to make public expression of the importance of the relation of the mouth to the rest of the body was Professor Osler, in 1905. In an address at Oxford University, he said, among other things, that the dentist must be a propagandist for the betterment of public health. Then came Sir William Hunter's address at McGill University in 1910, which he termed "Septic American Dentistry." This address thoroughly aroused the medical profession, and through them the public, as to the importance of mouth conditions in relation to bodily health.

Dentistry had been too much occupied with adult repair work to give proper attention to prevention or even control of mouth diseases.

As the result of research work and investigation of existing conditions, the profession of dentistry was forced to realize through the combined findings of the radiologist, pathologist, bacteriologist and economist, the hopelessness of fulfilling its mission through means of reparative dentistry. Furthermore, it has come to the realization that its greatest and main service to humanity must consist henceforth not merely in rendering palliative treatment, but in the controlling and preventing of oral diseases and their sequelae.

We are, as yet, far from being able actually to prevent defective teeth because a high percentage are so at eruption. We can, however, control and, to a large extent, prevent dental caries by early and systematic treatment. The esthetic phase of dentistry is merely an incidental advantage attained in striving for general health.

It is interesting to note the replies to Dr. Millberry's request[1] for expressions of opinion on the future of operative dentistry from leading men in various parts of the country. They are indicative of the changed attitude of the profession toward general health.

Dr. Kells answered: "Why, the operative dentistry of the future lies in the hands of the deans of our schools!"

Dr. Miner, dean of the Dental School, Howard University, said that dentistry is essentially a public health problem and that the education of the public and the profession itself, developing men for research work in dentistry, are the hope of the future.

Dr. Frank Taylor said that the tendency in dental education in New England is toward stressing the preventive and oral hygiene side, with the reparative side as necessary for the present.

The answer of Dr. Kells, Dr. Miner and Dr. Taylor are substantiated by the fact that both schools in this state have instituted thorough courses in children's dentistry, teaching principles of prevention and the control of dental caries as a public health measure. This advanced step is a positive innovation in dental education, which previously held the construction of plates, bridges and the insertion of large fillings as the acme of success in teaching the art of dentistry, rather than instruction which, if followed, would largely obviate the necessity for these ingenious appliances.

It is our duty to the child (our citizen of a few years hence) to assure the best possible physical and mental equipment; to provide every means of growth and development of perfect bodies. While many factors enter into this field, the care and protection of teeth of the rising generation is of great importance; particularly in view of the fact that their living conditions are ever becoming more artificial and food is deviating from the natural.

Are we, as dentists, doing our duty in view of existing deplorable oral conditions? We are told that 84 per cent of children at the age of 3 have caries. A few years later, 95 per cent of the same children are virtually dental cripples. In the United States, this amounts to 16,000,000 school children with mouth conditions menacing their general health. Can there be any solution other than children's dentistry? Can dentistry improve the health of these people when they finally do come to your offices as adults?

Do we wonder that the medical profession looks to us for the next great step in preventive medicine?

What is children's dentistry and how does it differ from accepted orthodox dentistry? Orthodox dentistry has dealt almost exclusively with well-established diseased conditions. Children's dentistry aims to prevent these same conditions, as well as their systemic results.

Children's dentistry, in an operative sense, is just plain honest, common sense dentistry started at the proper time in life—2 years of age. It considers the normal physiologic function of the mouth and teeth as the first and one of the most important functions in the process of digestion and influencing development of the whole body.

Some of the advantages to the patient are: cleaner mouths; better development of the face, nose and sinuses; maintenance of function as an influence for better digestion and health; better mentality and citizenship; a minimiz-

1. Millberry, G. S.: The Future of Operative Dentistry—A Forecast, J.A.D.A., 12: 909 (Aug.) 1925.

ing of pain and nervous reflexes, diseased conditions that lead to the root canal problem, and loss of teeth and function, etc., necessitating extensive repair work.

When more is known about heredity, environment, diet, saliva, ductless glands, etc., we may be able actually to prevent dental caries. I believe caries of the teeth can and will be banished from the face of the earth as has smallpox, yellow fever, diphtheria and many other scourges. But the best means that we have to stem the tide of caries in the light of present knowledge is the early eradication of incipient lesions, such as deep pits, fissures, etc.

Children's dentistry is not spectacular or sensational, nor does it presuppose miraculous cures. It is rational, early, continuous and systematic application of our dental knowledge. Considering the subject coldly as a matter of professional policy, the question is not one of adoption or rejection but how it can be carried on in general practice.

It is perfectly obvious that we must first educate parents. In our professional capacity, the public rightfully expects guidance and education pertaining to the advancement of your profession. It is part of our service to the community.

Jenner's discovery of vaccination to prevent smallpox would be of little value if our people had not been educated first to understand and then accept vaccination. So it is with us. We must be frank and tell them of our newly acquired knowledge and what it means for their children in terms of health. Make parents see as you see the dawn of a new era in dentistry. Be enthusiastic and impress its importance and value in end results from an esthetic, functional, mental and physical aspect. Educate to the point where the majority will not only accept, but it will actually demand a service which is for the good not only of their children, but also of all posterity. Explain to the parent the advantages of bringing children to you at 2 years of age. Insist on it if you are to give the best possible service. It must be understood that, to do this effectively, our service must be continuous and systematic, and with the cooperation of the parent.

We are morally obliged to educate parents, but if, for any sufficient personal reason, we do not care to operate for the child, our professional obligation demands that we refer the parent where she can get it done, not necessarily to one who limits his practice to children.

Unfortunately, dentists in general maintain that children are unsatisfactory as patients. They say that youngsters break up the routine of a quiet, well-organized office: they are difficult to manage, nerve-wracking and, in many cases, exasperating. This need not be true—is not true—of most children. On the contrary, children make delightful patients. Their version of things and of life itself, as seen through innocent eyes, their infinite fund of questions, all go to make them attractive patients. I will say "Children make the best patients." Many times there exists a mutual misunderstanding—the dentist fears trouble and the child fears the unknown or pain. Your fears will disappear when you have learned how to control the situation and confidence will replace the child's fear when you have demonstrated that you are a human being with a capacity for love and understanding.

The confidence of the child in the

dentist is the keynote of successful management of children. To gain and strengthen this great trust, certain qualifications are essential. They are but normal attributes such as honesty, kindness, patience, firmness and a working knowledge of the child mind, its attitude and capacity. The greater the knowledge of child psychology, the greater the measure of success to be expected.

The general practitioner who desires to give children's dentistry a fair trial should reserve a morning a week, preferably Saturday, for children, and gradually increase this as the demand warrants.

The dental anatomy and the occlusion of deciduous teeth differ from that of permanent teeth, but the operative technic is the same. It is necessary to care for the temporary teeth. No defect is too small to receive careful attention and treatment. The work is complicated by the eruption and exfoliation of teeth and the results of pernicious habits. Otherwise, dentistry for children is comparatively simple and easy for both operator and patient.

Operative procedure should be undertaken in successive steps, graded from the simplest to the most difficult. The relief of pain, of course, demands first consideration. But there should be no painful condition if children are seen early.

We will consider the ordinary steps: (1) prophylaxis, (2) thorough examination and (3) small fillings. If the child is seen early, these three steps only will be required.

This type of dentistry is a service, not a series of operations. The operator must have a conception of his work as involving not only the physical but the mental and moral issues as well. The responsibilities are great, but the end-results are more sure and of greater benefit to the patient than any other known type of dental service.

The question of adequate remuneration for children's dentistry is of extreme importance and should be considered seriously, if general participation in this work is to be successful. The outstanding hinderance to children's dentistry in general practice resolves itself into this question of fees. The time-worn argument that the public will not pay adequately for dental service rendered children is in no way justified. This false impression and misconception is the fault of the dentist who has, unwittingly, belittled the value of this important service for children. A reasonable yearly service charge is the solution of the fee problem. Parents will not and do not, when properly educated, hesitate to pay for a service which tends to make their children stronger, happier and more useful men and women. A fixed yearly charge mitigates the parents' worry in trying to fit unexpected bills into the family budget and assures the keeping of appointments. A reasonable yearly rate depends entirely on the value we place on our time and the number of hours a case will require during the year. We must know the value of our time; no one can tell us that; it is what we believe it to be for services rendered.

The time required for cases varies, depending on our operating speed, the history of the case, the age seen for the first time, the general physical condition, the tractability of the patient, the environment, etc. As a working basis, two to three hours a year in three to five appointments is ample to obtain the maximum of prevention and the

minimum of operative repair work for a normal child seen before 3 years of age. Taking the responsibility of appointments for periodic examination as part of our service, the time alloted is generally sufficient to carry the average child through to adult dentition with its full complement of clean, vital, healthy teeth. Children seen for the first time at 6 years of age require more time to have their mouths put in a healthy condition in the first series of visits. If your work is well done, two hours a year thereafter is generally sufficient. Children seen at 6, 5 or even 4 do not afford us the opportunity to approach the maximum of prevention, as their mouths are already mutilated by decay, pulp involvements and abscesses; a further consideration for us in regulating our fees.

The dentist who realizes the true value of children's dentistry, and conveys his knowledge to his patients, and does the necessary educational work, will have little difficulty in collecting a proper fee for the most efficient, conservative and constructive service the dental profession can render.

The highest ideal of dentistry, a health service, can only be achieved by adherence to these fundamental principles. So doing, we can help dentistry to discharge its responsibility to posterity and further its standard of service to the world.

The late Charles W. Elliott said, with prophetic vision, a quarter of a century ago, to a graduating class at Harvard Dental School: "If your professional object henceforth is limited to the replacement of broken down human tissues, and you neglect to fulfill your obligation in connection with the prevention of mouth diseases, you will prove yourselves unworthy of your diplomas."

520 Beaver St.

WEST VIRGINIA DENTAL CLINICS

A splendid demonstration has been made by the Parkersburg city schools. The dental department was organized there seven years ago and passed out of the pioneer stage sometime ago. A dentist and two oral hygienists who are employed for full-time compose the staff. This department takes care of the dental problem in its entirety in all age groups throughout the schools.

For several years, the city school system of Morgantown has provided the minimum dental department-equipment, dental room and oral hygienist for full time. A great deal of educational work of broad scope has been accomplished by the oral hygienist, and prophylactic care has been given to all pupils. When the school system embraced the entire Morgantown District, the staff in this department was not increased, although it functioned efficiently for the entire district.

The health department of the Woman's Club of Elkins succeeded in financing the equipment for a dental room in the Central school there. Here, the local dentists volunteer their services free of charge for a certain part of each week. It is hoped the clinic will develop into a permanent part of the school organization.

DENTAL WORK FOR SCHOOL CHILDREN IN GERMANY

A survey made by the Association of German municipalities among its member cities to find out the extent of dental work for elementary-school children has shown that, out of ninety-two cities with a population of more than 50,000, a total of fifty cities maintain municipal dental clinics for school children. In the other cities, free examinations and treatment are provided at university clinics, through sickness-insurance funds, or by private dentists employed by the city for this work. In at least twenty-eight cities, dental treatment is provided in compulsory continuation schools also. The cost of this work is met almost entirely by the municipalities, although in some cities subsidies are also granted by the social-insurance funds. A

small fee is collected from the patients in some of the cities.

HAWAII

A NEW ACT RELATING TO DENTAL HYGIENISTS

An Act to Amend Sections 1083 and 1084 of the Revised Laws of Hawaii 1925, as Amended by Act 33 of the Session Laws of 1925, Relating to Dental Hygienists:

Be it Enacted by the Legislature of the Territory of Hawaii:

Section 1. Section 1083 of the Revised Laws of Hawaii 1925, is hereby amended to read as follows:

"Section 1083. Who may become dental hygienists. Any person of good moral character being eighteen years of age or over and holding or having a diploma or a proper certificate of graduation from an accredited high school employing at least a four-year course of instruction, who is a graduate of a training school for dental hygienists, having at least a two-year course, accredited and recognized by the Board of Dental Examiners, may, upon payment of fifteen dollars ($15.00) to the Board of Dental Examiners, be examined by said board on subjects considered essential by it for a dental hygienist. If the applicant, in the opinion of the board, successfully passes such examination, he shall be registered and receive a certificate of ability to practice as a dental hygienist in this Territory. Every registered dental hygienist, before entering practice, shall pay the said

Exhibit of the University of Illinois, College of Dentistry, which won first prize among the scientific exhibits at the recent meeting of the American Dental Association in Detroit.

board two dollars and fifty cents ($2.50) and secure from it an annual license to practice. Before the first of May in each year, every registered dental hygienist desiring to begin or continue to practice in the Territory of Hawaii, shall pay to the Board of Dental Examiners a fee of two dollars and fifty cents ($2.50) for the annual registration thereof. The failure, neglect or refusal of any such duly licensed dental hygienist to pay such annual registration fee during the time his or her license shall remain in force shall constitute a forfeiture of such license, but such license may be restored upon written application therefor and the payment to said board of such additional sum as it may fix, not to exceed the sum of fifteen dollars ($15.00).

Two examinations shall be held in each year, one in July and one in December.

No person shall practice dental hygiene in the Territory of Hawaii, either gratuitously or for pay, or shall offer or attempt so to practice, or shall advertise or announce himself publicly or privately as prepared or qualified so to practice, without having a license as in this section provided."

Section 2. Section 1084 of the Revised Laws of Hawaii 1925, as amended by Act 33 of the Session Laws of 1925, is hereby further amended to read as follows:

"Section 1084. The Board of Dental Examiners may issue, without examination, to any person qualified as aforesaid to be examined, a temporary license to practice as a dental hygienist under the employe of the Department of Public Instruction, or the Board of Health or any legally incorporated eleemosynary dispensary or infirmary, private school or welfare center; such temporary license to be in force only while said dental hygienist is in the employ of the said Department of Public Instruction, Board of Health or legally incorporated eleemosynary dispensary or infirmary, private school or welfare center, and shall automatically be cancelled when said dental hygienist shall have been examined by the Territorial Board of Dental Examiners, and shall be subject to revocation by said Board of Dental Examiners at any time."

Section 3. This Act shall take effect upon its approval.

Approved this 25th day of April, A. D. 1927.

W. R. FARRINGTON,
Governor of the Territory of Hawaii.

AN APPROPRIATION WORTHY OF ATTENTION

GENERAL SCHOOL FUND 1928-29

III. *SPECIAL SCHOOLS AND DEPARTMENTS:*

E. *DENTAL HYGIENE DEPARTMENT:*

1. *DENTAL HYGIENISTS:*

	1926-27	1928-29
(1) Salaries	$ 64,800	$ 81,940
(2) Maintenance, repairs, equipment, supplies, travel expense, transportation, etc.	13,580	17,660
Total	$ 78,380	$ 99,600

2. *DENTISTS:*

(1) Salaries	$ 28,800	$ 37,200
(2) Maintenance, repairs, equipment, supplies, landry, postage, etc.	5,800	7,400
Total	$ 34,600	$ 44,600
Grand Total	$112,980	$144,200

ANNUAL REPORT OF DENTAL SERVICE, DEPARTMENT OF PUBLIC HEALTH, TORONTO

The following is a report of the work performed by the Dental Service of the Department of Public Health during the year 1926:

Two appointments were made to the staff in 1926, which now consists of the director, who is responsible to the medical officer of health, and thirty-two dental officers, each of whom has a trained assistant. The service conducts thirty clinics in the schools, twenty-five in the public schools and five in the separate schools. Three dental officers devote their whole time to the dental survey and all school children are dentally examined each year.

A study of the statistics shows that as a result of the educational campaign conducted by the school medical officer, the dental officer and nurse, teaching that a clean mouth is one of the first essentials to good health, out of 74,238 children examined only 1,090 had septic mouths and 1,482 had unclean mouths, which together are only 3 per cent of the total number examined. This is a great improvement over conditions existing before a dental service was inaugurated, when over 50 per cent of children had seriously unhealthy mouths.

The percentage of children with defective teeth remains the same as last year, viz., 66 per cent or 49,369, but here again, an improvement over former conditions when from seven to ten cavities per child was the rule, can be seen, as the average is now only two cavities per child. One fact to be regretted is the prevalence of irregular teeth, 10,185 out of the 74,238 examined, which is nearly 14 per cent, being reported as having faulty occlusion. This is a problem to which some attention must be given. Orthodontic treatment, or the straightening of the teeth, owing to the special knowledge required and the length of time to accomplish correction, seems entirely outside the scope of a public service, but somethiing could be done in the way of preventive orthodontia in the preschool years, so that such serious conditions would not arise later on.

During the year, dental service was extended to the two new vocational schools. Equipments were installed and Dr. Russell Bennett was appointed to the Junior Vocational School for Boys, and Dr. Flora Cowan to the Edith L. Groves School for Girls. The principals of these schools consider the correction of dental defects a most important factor in their work for these backward children.

Also in 1926, the department opened in cooperation with the Dental Faculty of Toronto University a children's clinic at the Dental College. The Dental Faculty maintains a clinic for the purpose, equipped with ten chairs, and also places the facilities of special laboratories, the x-ray, the surgical, bacteriological and preventive dentistry departments, at the disposal of this clinic for the study and treatment of special cases. The clinic is in charge of a dental officer of the department, and his assistant arranges appointments for school children through the nursing service and makes reports of all operations performed, to the department. Each student is required to spend one month's service in this children's clinic, and thus acquires a useful knowledge of children's dentistry and public health service. In addition to taking care of all cases referred to them, the college also takes radiographs of any special cases from our own clinics. They also undertook orthodontic treatment, or the straightening of teeth for sixty cases of malocclusion, selected from the schools. A special study is also being made in their research laboratories of the problem of rapid decay in the teeth in young children, from which it is hoped some new light may be thrown on this condition.—J. C. Hastings (Medical Officer of Health) and E. A. Grant (Director of Dental Services), in *Oral Health.*

PROMOTION OF THE WELFARE AND HYGIENE OF MATERNITY AND INFANCY

The act for the promotion of the welfare and hygiene of maternity and infancy, passed by Congress, Nov. 23, 1921, which is properly known as the Sheppard-Towner Act, makes available to the states that match the appropriation by state funds, federal aid for reducing maternal and infant mortality and promoting the health of mothers and infants. At the close of the fiscal year 1924, forty-five states were cooperating under the provisions of the act. By action of the sixty-eighth Congress, its benefits were also made available to and accepted by the Territory of Hawaii. Several of those states are conducting noteworthy work in dental hygiene. A report of this phase of the work taken from the bulle-

tin on "The Promotion of the Welfare and Hygiene of Maternity and Infancy," published by the U. S. Department of Labor, Children's Bureau (Publication No. 178) is as follows:

"Information in regard to the development and care of the teeth is disseminated at practically all conferences. The importance of the mother's diet during pregnancy when the baby's temporary teeth are being laid down, of the diet of the small child when the permanent teeth are being formed, of the cleaning of the teeth and filling of temporary teeth, and of the care of the first permanent molars and early permanent teeth are all given special attention in the course of any conference. This, in the opinion of seven states, was not enough, and full-time or part-time dentists or dental hygienists were employed by them, and eighty-four dentists gave volunteer services at dental conferences. At these conferences, 32,265 children and 853 expectant mothers were examined and received dental advice.

"Seven states reported the employment of dentists or dental hygienists, usually for short periods of time: Colorado, Iowa, Louisiana, Maryland, Mississippi, Pennsylvania and Virginia. Only two, Iowa and Louisiana, had full-time dentists regularly on the staff. In Mississippi, a dental hygienist was employed jointly by the maternity and infancy division and other divisions of the state board of health."

DELAWARE DENTAL HYGIENE EXHIBIT

An interesting exhibit giving special attention to dental hygiene was shown at a county fair by the Delaware Anti-Tuberculosis Society. The teeth of all children between the ages of six and twelve were examined free of charge. As an inducement, fifty cents was offered to every child who had perfect teeth. Four dentists, who each gave one afternoon to the booth, were in charge of the work. Printed matter on the care of teeth, obtained from insurance companies and tooth paste and toothbrush manufacturers, were distributed. Every child was presented with a story book and a tube of tooth paste.—*Bull. Nat. Tuberculosis Ass'n.*

Medical and Dental News

Arizona

Newly Elected Officers of State Society: Newly elected officers of the Arizona State Dental Society are: president, R. Dean Creamer, Phoenix, and secretary, L. D. Dameron, Phoenix.

California

Officers of Southern California Society: Newly elected officers of the Southern California Dental Society are: president, Guy B. Bird, Los Angeles; secretary, Charles M. Alderson, Los Angeles (reelected); treasurer, H. F. Boeckman, Pasadena (reelected).

Florida

State Society Meets: At the recent annual session of the Florida State Dental Society, the following officers were elected for the ensuing year: president, F. L. Adams, Tampa; first vice president, W. J. Fitzpatrick, Miami; second vice president, Fred M. York, St. Petersburg; secretary-treasurer, C. C. Stewart, St. Petersburg. Five hundred were in attendance. Miami was selected for the next meeting place.

Iowa

Dr. Hildebrand Chairman of Clinics: John G. Hildebrand, Waterloo, has been appointed chairman of clinics for the Seventieth Annual Session of the American Dental Association, to be held in Minneapolis, Aug. 20-24, 1928.

Missouri

Northwest District Society Elects Officers: The following have been elected as officers of the Northwest Missouri District Dental Society: president, R. E. House, Gallatin; vice president, B. F. Mann, St. Joseph; secretary-treasurer, A. R. Harold, St. Joseph (reelected).

New Hampshire

Officers of State Society: The officers of the New Hampshire Dental Society for the year 1927-1928 are: president, H. L. Watson, Manchester; vice president, A. W. Woodman, Plymouth; secretary, W. J. Moyles, Manchester; treasurer, W. A. Young, Concord.

Ohio

Chiropractic Bill Defeated: Ohio dentists were instrumental in helping the state medical association to defeat the Chiropractic Bill, which proposed granting chiropractors with eighteen months' schooling all privileges of regular physicians, including treatment of infectious diseases, signing of birth and death certificates and the privilege of practicing in hospitals and institutions.

New Instructors at Western Reserve: John Theron Illick comes to the department of histology and embryology after several years of teaching in America and China. Milton Neeham Thompson comes from the University of Virginia to assist in the teaching of operative dentistry.

Northwestern Society Schedules Programs: The Northwestern Ohio Dental Society has arranged a series of monthly meetings with the following essayists: Thomas J. Hill, Cleveland, who addressed the society, November 16; Harry S. Noble (M.D.), St. Marys, who will speak January 18; Edward H. Hatton (M.D.), Northwestern University Dental School, Chicago, who will be the speaker on February 15; and Earl G. Jones, Columbus, who speaks March 21. April 18, a round table will be held.

Ohio State Society Elects Officers: The following are the newly elected officers of the Ohio State Dental Society: president, J. W. Hartshorn, Toledo; president-elect, E. S. Braithwaite, Willard; vice president,

D. P. Snyder, Columbus; treasurer, Harry Cope, Columbus; secretary, E. C. Mills, Columbus. The next meeting will be held at Toledo, Dec. 4-6, 1928.

TENNESSEE

Fifth District Society Elects Officers: At the recent meeting of the Fifth District Dental Society at Lewisburg, the following officers were elected: president, M. D. Meadows, McMinnville; vice president, W. W. Jones, Murfreesboro; secretary-treasurer, J. C. Taylor, Fayetteville.

Eighth District Society Elects Officers: At the semi-annual meeting of the Eighth District Dental Association, in McKenzie, November 14, the following were elected as officers for the ensuing year: president, B. G. Gallimore, McKenzie; vice president, J. T. Crews, Jackson; secretary-treasurer, W. R. Levy, Jackson. The next meeting will be held in Jackson, January 11.

VIRGINIA

Dr. Mabry Commissioned in Army Dental Corps: Leland S. Mabry, Hampton, has been commissioned a first lieutenant in the United States Army Dental Corps. He has been assigned to duty at Fort McPherson, Ga.

Dr. Snapp Dental Examiner: Ralph B. Snapp, Berryville, has been appointed a member of the Virginia State Board of Dental Examiners for a three-year term.

GENERAL

Appointed to the National Board of Dental Examiners: Henry J. Feltus, president of the National Association of Dental Examiners, announces the following appointments to the National Board: O. E. Jackson, California, five years; T. A. Broadbent, Illinois, four years; A. L. Midgley, Rhode Island, three years; A. H. Reynolds, Pennsylvania, two years; George P. Powers, Tennessee, one year.

Appointments on the 1928 Local Committee: The following have been selected to serve on the Local Committee on Arrangements for the Seventieth Annual Session of the American Dental Association, to be held in Minneapolis, Aug. 20-24, 1928: general chairman: Harry W. Nelson; vice chairman: Henry P. Boos; advisor, Thomas B. Hartzell; secretary-treasurer, Clayton A. Swanson; clinics, Carl O. Flagstad; commercial exhibits, C. E. Rudolph; entertainment, B. G. DeVries; reception and transportation, Elmer S. Best; health exhibits, F. Denton White; publicity, Verner H. Nilsson; halls and hotels, William C. Naegeli; information, Hilary J. Maze; registration, D. E. Ziskin; arrangements for associated groups, Benjamin Sandy.

Section Officers, 1928: The following have been chosen as officers of the scientific sections for the Seventieth Annual Session of the American Dental Association to be held in Minneapolis, Aug. 20-24, 1928: Section on Operative Dentistry, Materia Medica and Therapeutics: chairman, George W. Hillias, Kansas City, Mo.; vice chairman, F. W. McDonald, New York City; secretary, H. B. McCarthy, Baltimore, Md.; Full Denture Prosthesis: chairman, Victor H. Sears, New York City; vice chairman, I. V. Duell, Louisville, Ky.; secretary, E. B. Owen, St. Louis, Mo.; Partial Denture Prosthesis: chairman, Nye White Goodman, Los Angeles, Calif.; vice chairman, Edward H. Hubbuch, Louisville, Ky.; secretary, William A. Squires, New York City; Oral Surgery, Exodontia and Anesthesia: chairman, Joseph P. Wahl, New Orleans, La.; vice chairman, A. L. Frew, Dallas, Texas; secretary, Roy S. Hopkinson, Milwaukee, Wis.; Orthodontia and Periodontia: chairman, Arthur H. Merritt, New York City; vice chairman, Charles R. Baker, Evanston, Ill.; secretary, C. H. Gracey, Detroit, Mich.; Mouth Hygiene and Preventive Dentistry: chairman, N. Talley Ballou, Richmond, Va.; vice chairman, Robin Adair, Atlanta, Ga.; secretary, G. H. Wandel, Iowa City, Iowa; Histology, Physiology, Pathology, Bacteriology and Chemistry (Research): chairman, Russell W. Bunting, Ann Arbor, Mich.; vice chairman, A. W. Bryan, Iowa City, Iowa; secretary, Edward H. Hatton, Chicago, Ill.

DEATHS

Barron, Wilson D., Camden, Maine; Tufts College Dental School, 1904; died, November 9; aged 51.

Bird, Charles Heber, Farmington, Utah; died, November 12, after a few days' illness with influenza; aged 73. Dr. Bird had been in practice for forty-eight years.

Bollenbach, George William, Chicago, Ill.; Northwestern University Dental School, 1902; died, November 2, after a brief illness; aged 48.

Brandenburg, Charles W., Frankfort, Kan.; died, November 2, after an operation; aged 62.

Brookling, David Long, La Belle, Mo.; University of Louisville School of Dentistry, 1900; died, November 3, after a long illness; aged 57.

Dorland, W. A., Grand Rapids, Mich.; Temple University School of Dentistry, 1882; died, October 31; aged 71. Dr. Dorland practiced in Grand Rapids for forty-five years.

Downes, Arthur V., East Providence, R. I.; Georgetown University, School of Dentistry, 1924; died, November 12, after a three months' illness; aged 27.

Furman, Joel N., Bay Shore, N. Y.; University of Maryland, School of Dentistry and Baltimore College of Dental Surgery, 1887; died, November 18, from apoplexy; aged 62.

Glasier, E. S., Cedar Rapids, Iowa; State University of Iowa, College of Dentistry, 1887; was killed by a train, November 5.

Groff, J. H., Dillsburg, Pa.; died, October 27, after a brief illness; aged 76.

Hull, John B., Schenectady, N. Y.; died, November 3; aged 87. Dr. Hull had practiced dentistry in Schenectady for fifty-five years.

Irwin, Fred H., Mishawaka, Ind.; Northwestern University Dental School, 1896; died, November 25; aged 54. Dr. Irwin's death followed an operation for ulcer of the stomach.

Jacobs, Gordon G., Carthage, N. Y., University of Buffalo, School of Dentistry, 1918; died recently.

Jones, Victor S., Bethlehem, Pa.; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1885; was accidentally shot by his companions while out hunting. Dr. Jones was 70 years of age.

Lambert, Edmund, Springfield, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1885; died after a four years' illness, November 17; aged 69.

Lawton, Ernst J., Milwaukee, Wis.; State University of Iowa College of Dentistry, 1898; died suddenly, November 11; aged 53.

Littig, H. A., Davenport, Iowa; Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania, 1889; died, November 14; aged 63.

Miller, Lincoln E., Pittsburgh, Pa.; Temple University School of Dentistry, 1888; died, October 20.

Mulhollan, W. E., Juneau, Alaska; died, September 30.

O'Neal, H. E., Chicago, Ill.; Chicago College of Dental Surgery, Dental Department of Loyola University, 1905; died suddenly after a minor operation, October 21; aged 52.

Pepper, Henry A., Libby, Mont.; North Pacific College of Oregon, School of Dentistry, 1922; died, November 10; aged 30.

Roberts, George, Cedar Falls, Iowa; died, October 15; aged 73.

Saylor, H. D., Philadelphia, Pa.; died, November 17, from heart failure. Dr. Saylor was a graduate of and instructor in the Thomas W. Evans Museum and Dental Institute School of Dentistry, University of Pennsylvania.

Scranton, Thomas S., Madison, Conn.; died, November 15; aged 97. Prior to the Civil War, Dr. Scranton maintained a dental office in Springfield, Ill., adjoining the law office of Abraham Lincoln.

Sperling, Isaac D., Chicago, Ill.: University of Michigan, College of Dental Surgery, 1883; died, November 30; aged 71. Dr. Sperling retired two years ago after forty years practice of dentistry.

Stahl, John V., Canton, Ohio; Ohio College of Dental Surgery, Dental Department of the University of Cincinnati; died, November 10.

Stoney, Arthur Crawford, New York City; died, November 6.

Unangst, Jacob D., Davenport, Iowa; died suddenly, November 2; aged 74. Dr. Unangst retired from active practice in 1912.

Wakeley, George Washington, Orange, N. J.; New York College of Dentistry, 1896; died, May 9; aged 65. Dr. Wakeley was a past president of the New Jersey State Dental Society and the Central Dental Association of Northern New Jersey.

West, Frank, Troy, Ohio; Western Reserve University School of Dentistry, 1897; died, November 17, from a stroke of apoplexy; aged 59.

CURRENT LITERATURE

EXTRACTS AND ABSTRACTS

Dermoid Cyst of the Floor of the Mouth: A case of dermoid cyst in a girl, aged 15, is reported by J. R. Cameron and G. V. Boyko (*J.A.M.A.*, Oct. 1, 1927). The swelling under the tongue had first been noticeable three weeks before the patient came in. There had been no pain nor discomfort, but during the two weeks previous, there had been rapid increase in the swelling, and difficulty in speech and mastication was becoming evident. The tumor was semisoft and nonmovable, about the size of a walnut and extending from the margin of the molar and bicuspid teeth on the one side to the corresponding teeth on the opposite side, and from the sublingual frenum to the incisal plane of the lower incisors. Pressure caused no pain. Under ether anesthesia, an intraoral midline incision was made of sufficient length to expose the neoplasm thoroughly, and the tumor was enucleated. Recovery was uneventful. The authors conclude that the cyst was a dermoid, on the basis of the presence of the inner lining of stratified epithelium and cells characteristic of sebaceous glands, together with the fatlike contents of the cyst. The success of the operation is largely dependent on enucleating the cyst without rupturing the sac.

Prevention and Treatment of Rickets: Results of experiments in treating rickets with cod-liver oil and ultraviolet irradiation, and with sunlight admitted through special glass, are reported by E. T. Wyman (*Boston M. & S. J.*, Sept. 8, 1927). The glass used was of three types: clear quartz, Corning glass and Vitaglass. Nine cases were observed as regards response to this type of therapy. Four of the patients received the sun's rays through quartz; three through Corning glass, and two through Vitaglass. The first two groups showed definite evidence of recovery. The fact that the results in the last mentioned group were disappointing is explained as possibly due to the fact that the two babies were very black negroes. Cod-liver oil will prevent rickets in the majority of cases. Slight rickets in rapidly growing breast-fed infants is of little consequence, but premature infants require treatment. When cod-liver oil is not tolerated, ultraviolet rays must be resorted to. In hospital practice and individual cases, where the diet is inadequate or there is a lack of sunshine, cod-liver oil should be given as a routine prophylactic measure from October to May.

Antirachitic Therapy: In a series of articles, Frederick F. Tisdall and Alan Brown (*Am. J. Dis. Child.*, November, 1927) discuss (1) the seasonal variation of the antirachitic effect of sunshine; (2) the antirachitic effect of skyshine, and (3) the antirachitic value of the sun's rays through various special window glasses. 1. They conclude that the sun's rays during December, January and February (latitude of Toronto) produce a slight but definite antirachitic effect on rats fed on a rachitogenic diet. A sharp increase occurs in the antirachitic effect of sunsine about the first of March. The antirachitic effect of sunshine in April and May is approximately eight times as great as in December, January and February. The increase in the antirachitic effect of sunshine in March, April and May is apparently due not so much to an increase in the amount of the ultraviolet rays of the length present in the sunshine in winter as to the presence of rays that are shorter than those found during the winter. 2. As regards, "skyshine," they find that the antirachitic effect of the reflected rays from the sky and clouds is approximately from one-half to two-thirds as great as that produced by what is ordinarily termed sunshine (rays from the sun plus the reflected rays from the sky). Reddening of the skin by ultraviolet rays is not a suitable unit for measurement of ultraviolet therapy. It should

be considered simply as an accompanying phenomenon which may or may not be a measurement of ultraviolet rays received. 3. Regarding the value of the sun's rays when received through various special window glasses the findings are as follows: The antirachitic effect of the sun's rays (including skyshine) through Vitaglass, Vioray glass and Corning special glass is from 25 to 50 per cent of the antirachitic effect obtained without the use of glass. Obvious differences could not be detected in the efficacy of the three glasses. No antirachitic effect, or at the most a negligible effect, is produced by the sun's rays through ordinary glass. The antirachitic effect of skyshine through an ordinary window glazed with special glass (Vioray) is slight—in fact, almost negligible—except immediately adjacent to the window. Similar results were obtained with rays through an open window covered with ordinary fly screen. In order to obtain much benefit from rays through an open window, or a window glazed with special glass, it is necessary to receive the direct rays of the sun. The use of special glass during the winter months is probably of little value. Its use in the latitude of Toronto is justified from about the first of March on, as the inclement spring weather prohibits the exposure of patients to the sun's rays, which at that time have a great antirachitic effect.

Action of Alcohol on the Body: In a discussion of the effects of alcohol consumption on the body and on its output of work, J. F. Daniel (*Scientific Monthly*, November, 1927) details experiments to determine its effect on free or exposed cells and on groups of cells, or organs; its action on muscular coordination and other types of coordination; its effects on work, on simple reflexes and on skilled acts. He concludes: By experience then we have learned that alcohol is not a cure-all; that it can be applied advantageously to but few diseases, and that in excess it is injurious. By experiment we have ascertained that even moderate amounts of alcohol may decrease the activity of a muscle and may militate against precision and accuracy in various types of skilled acts. We are, at present, especially ignorant, however, of one phase of the action of alcohol. As might be expected, it is precisely on this point that men are in the widest disagreement. One group holds that alcohol is a real benefit to mankind in that through its use men can get relief from petty worries. As Starling says, alcohol may be used, to produce the increased pleasure of living. This subjective effect is without doubt the reason for social drinking; for the banquet goes better after inhibitions have been removed. A second group maintains, however, that man should be sportsman enough not to need the aid of alcohol to make the banquet a go; that he profits by cultivating his natural endowments to this end and at the same time runs no risk of injury to body and mind.

Lead Treatment of Cancer: The value of Prof. Blair Bell's lead treatment of cancer remains *sub judice*. He recently stated that out of 270 cases treated, fifty-four were influenced, while in 116 there appeared to be no effect. In some cases, the disease appeared to have been arrested. In one case, the growth was beneficially affected, although the treatment appears to have proved fatal. A woman was admitted to the Birmingham General Hospital because of inoperable cancer. Eight injections of the lead preparation had the effect of reducing the cancer from the size of a man's fist to that of a hazel nut, and the woman returned to almost normal health. After the ninth injection, however, she developed toxic symptoms, and died a few days later. A necropsy revealed the presence and probably 10 per cent of that represented the overdose. At the inquest, Dr. Francis Lamb, pathologist to the Cancer Research Committee, agreed that the woman would not have died had she not had the last injection. The coroner, in returning a verdict of "death from fatty degeneration of the liver, probably due to lead poison," said that the treatment had been properly administered.—London letter, *J.A.M.A.*, Oct. 22, 1927.

Osteomyelitis of the Upper Jaw in Scarlet Fever: A case of this rare condition is reported by T. B. Layton (*Dent. Surgeon*, Oct. 15, 1927), who also reviews the literature and quotes from several case histories on record. His patient, a boy, aged 6 years, developed an edema below the left eye, during the the course of an attack of scarlet fever. The area was incised, but the condition did not clear up. Bare bone could be felt through the sinus. There was marked swelling sublabially, and through this area,

under light anesthesia, an incision was made, and the whole region was dilated with sinus forceps, which passed up to the point near the orbital margin at which the abscess had been opened through the skin. The swelling lessened, but otherwise there was no improvement. In a second operation, the external wall of the maxilla came away in small pieces, and two permanent lateral incisors without roots were revealed, surrounded by purplish granulations. In tracing the necrosed bone backwards, the operator expected at any moment to open the maxillary sinus, from which it was thought that the disease had arisen. As the outer surface seemed normal, the operator did not proceed further. Every tooth sac was found to be infected, the tooth without roots, lying in its sac, surrounded by granulations. By incision across the mucous membrane, the whole alveolar margin on that side and a large part of the bony hard palate were removed. This wound did not heal, and a sequestrum which was visible through it was eventually removed. Thereupon, the wound healed, slowly. The author's conclusion is that, since the osteomyelitis was not secondary to suppuration in the sinus, it must have arisen from the presence of carious lateral incisors.

Dentistry and the Nervous Child: Conditions to be taken into consideration in dealing with the nervous child who comes in for dental care are considered by H. C. Cameron (*Brit. Dent. J.*, Oct. 1, 1927). The mother's attitude is of vital importance. She may bring the child into the room quietly and without undue explanation or reassurance, when all will be well; or she may suggest coming danger to the child by assuming a protective attitude and pouring endearing reassurances into its ear. A preliminary conversation with the mother may obviate the difficulty. It is well for the dentist to study the physical aspects of the nervous condition to be dealt with. The nervous child is often of unstable metabolism. He takes an intense interest in the whole business of life and exhausts himself in so doing. It is important that the child of nervous temperament be given enough carbohydrates to build up the tissues consumed by his activity. In the child of the well-to-do, there is likely to be a large element of fat and a restricted carbohydrate intake, the latter with the idea of avoiding dental caries. Postural defects are commonly found, due to lack of muscle tone, and associated with this condition are dark shadows about the eyes, pallor and sudden flushing, and tumultuous action of the heart on exertion. A subacute rheumatism, the result of lack of muscle tone, together with the other symptoms may lead to an order for prolonged rest in bed. Abdominal pain may result from fright, exhaustion or sustained effort. Variation in the temperature, with a rise toward evening, may lead to fear of a tuberculosis condition, but often adjustment of the diet will eliminate this. As a means of correcting these symptoms in the nervous child, the author suggests the same treatment that the anesthetist uses in dealing with acidosis, since the condition of the child resembles the physical state of all children during recovery from anesthesia; i. e., the administration of glucose by mouth. This is given before the visit to the dentist, and in powders dissolved in water and flavored with fruit juice. The dosage is three teaspoonsful in half a glass of water, given four times a day.

Influence of Pregnancy on Teeth: By experiments on rats given a diet deficient in calcium and vitamin during pregnancy, the author (G. Toverud, in *Norsk. Mag. f. Laegevidensk.*) has found a disturbance in the calcium, phosphorus and magnesium content of the constantly growing teeth. These experiments point to the fact that the diet during pregnancy is the controlling factor in the increased disposition to dental caries during this period of a woman's life. According to the author, the most common deficiency of the diet is lack of calcium and vitamin. A.—*Am. J. Dis. Child.*, November, 1927.

Does Irradiation of Cod Liver Oil Increase Its Antirachitic Potency? A comparison has been made of the antirachitic potency of a medicinal cod-liver oil before and after irradiation with ultraviolet rays from a quartz mercury vapor lamp. The oil was irradiated under carefully controlled experimental conditions for thirty minute and two hour periods. The antirachitic potency of the irradiated and nonirradiated oils was judged by feeding tests with young albino rats. The diagnostic features considered were growth curves, blood calcium and phosphorus, roentgenograms and pathologic examination. The results obtained by these four methods of examination were fairly consistent for each of the five groups of animals. In general,

the results of this study show that the irradiation for thirty minutes of a cod-liver oil potent in vitamins does not enhance its antirachitic potency and that irradiation for two hours noticeably decreases its antirachitic activity.—Edwin T. Wyman et al., in *Am. J. Dis. Child.*, November, 1927.

Dental Origin of Eye Disease: In some forty cases seen by Pereira Gomes (*Brasil-Med.*) in about two years, the eye lesion, usually retinitis or chroiditis, had as its cause a dental infection. The route followed by the infection may be direct through the bones, periosteal, hemolymphatic or irritative-reflex. Diagnosis, however, must be made very cautiously in such cases and only by exclusion.—Abstr. *J.A.M.A.*, Sept. 24, 1927.

Cases Involving Mandibular Branch of Fifth Nerve: One case, in a man, aged 24, who was referred for removal of a septic area in the mandible, in the region of the left first bicuspid, and a case of tic douloureux in a woman, aged 58, are reported by E. S. Wallace (*Dent. Sc. J. Australia*, Oct. 1, 1927). In the first case, the tooth had been extracted two years previously, but a sinus had persisted, with free discharge. Under block anesthesia, the diagnosis of infection involving the mental foramen was found correct, The mandibular branch of the fifth nerve was found to pass through a definitely septic area in the bone. It was necessary to sever the nerve and to resect it for some distance back into the canal, in order to clean up the infection. Contrary to expectation, there was no after-discomfort and sensation was normal in lip and chin. The author accounts for the latter fact by suggesting that the terminal branches of the mandibular nerve had been taken over by another sensory nerve, probably the lingual, owing to long-standing disease of the former. In the second case, the presence of a plexiform neuroma on the mucous membrane overlying the foramen caused agonizing pain, on the slightest contact. At the first operation, the neuroma and one half of the nerve was avulsed, and alcohol was injected into the mandibular canal. For one year, the patient was free from pain, and her health improved greatly. Pain again developed, centering about the surface of the bone about the first molar region, and the whole mandibular canal back to the ramus was opened, as much of the nerve as would come away was avulsed and alcohol was injected. This operation was also highly successful, the results lasting for eleven months. Pain at the time of reporting the case was centering in the right temporal fossa about the region of the gasserian ganglion. It was believed that the removal of the ganglion would become necessary, although it might be possible to insure another period of relief by injection of alcohol at the foramen ovale.

Thrush: In the course of the studies provoked by the persistence of the San Francisco epidemic, Faber and Clark (*Am. J. Dis. Child.*, September, 1927) made several important observations, which deserve widespread recognition. Therapeutic efforts have heretofore been directed vigorously toward preventing acidity in the mouth of infected persons and creating an alkaline condition. The new experiments show that *Oidium albicans* is adapted to growth in a wide range of hydrogen ion concentration, multiplying freely at the highly alkaline point of p_H 10, which is greater than could be maintained in the mouth for more than a brief time. Aside from securing oral cleanliness, treatment has usually consisted in the past in the local use of alkaline and mild antiseptic applications. Solutions of boric acid have been widely recommended. Faber's tests indicate that the growth of the offending fungus is barely inhibited by boric acid, in saturated solutions of which it survives for considerable periods (over a week). It is killed by 1:250 solution of formaldehyde but not by 1:500. The rather feeble penetrating powers of the substance and its rapid dilution by the secretions of the mouth, especially abundant in the presence of thrush, make it doubtful whether an effective concentration could be maintained long enough to sterilize the areas of infection, even when a solution stronger than 1 per cent solution of formaldehyde is used. As an outcome of their observations, Faber and Clark protest against the use of boric acid solutions, still a common practice, for the purpose of cleaning babies' mouths and eyes and the mothers' breasts. They are confident not only that this procedure is without value but also that it may at times be responsible for the propagation of infection. The sense of security which its use seems to give is wholly without foundation, and has doubtless lead to the neglect of useful precautions. In the case of thrush, the fungicidal efficacy of

several of the newer dyes has been investigated. They tend to approach the requirement of the ideal antiseptic for this purpose in that they combine rapid penetration with minimal toxicity. Methyl violet was early tested; acriflavine and mercurochrome-220 soluble, also have had favorable reports. The greatest promise, however, is centered in the use of gentian violet, of which a 1:25,000 solution destroys *Oidium albicans.*—*J.A.M.A.*, Oct. 22, 1927.

The Proper Attitude: It is very true that the men who demand the highest prices for their services are usually able to produce a very high type of work. On the other hand, if these men attract to them only the wealthy, they are discriminating against the less fortunate and are not living up to dentistry's avowed purpose. We have in mind instances in which dentists have charged several hundred and even several thousand dollars for cases of prosthetic work. Such cases are unusual, yet they affect the laity's general consideration of dentistry and serve to discourage many who need dental services. It is not our idea to condemn sufficient financial regard for the dentist, for, in fact, we feel that too many receive remuneration which is not commensurate with the services rendered. If there were a greater equalization of fees, there would be more dentistry. More dentistry means better dentistry in the end.—Editorial, *Dent. Students' Mag.*, October, 1927.

Common Food Fallacies: One of the most insane food fallacies is that which appears over and over again in the admonitions of quacks and is even subscribed to by some regular physicians—"Do not eat proteins with starches!" Nothing could be more absurd, for no harm whatever inheres in this procedure so long as whole wheat bread or beans digest well. Nature continually supplies this very combination in legumes and cereals and we are not accustomed to pry protein from starch before eating. Milk itself contains a complex carbohydrate and protein. Furthermore, when proteins are eaten they unite with the stomach acid and thus tend so to lower stomach acid, that there is more likelihood of alkaline salivary digestion proceeding unimpeded than if protein were not present to absorb some acid. Pragmatically the habit of eating starches with proteins is above reproach, for healthy people do this habitually and without detriment. Indeed, no conclusive evidence exists in the literature to show that a subnormal rate of any of the alimentary processes is caused by the addition of carbohydrate to a diet. On the contrary, the report of Cannon that a mixture of carbohydrate and protein foods leaves the stomach more rapidly than protein alone "makes it very probable that the addition of carbohydrates to the diet accelerates digestion and the discharge of the gastric contents."—T. S. Harding, in *Scientific Monthly*, November, 1927.

Ultraviolet Radiation: I am of the opinion that the greater use of ultraviolet radiation will not only help to build up the children, but may even raise the resistance to dental caries in both the youth and the adult. I do not suppose that we are receiving less sunlight in this country than formerly, but there is little doubt that, on account of the increase in manufacture and consequently of smoke, we are not obtaining sufficient of the beneficial rays, and that in this field there is a useful line of research. Further, while there is undoubtedly great difference of opinion, I have held for some years that the enamel of the teeth is not entirely an inert tissue, that vital changes may take place in it, and that it may at one time be more resistant than at another. The demonstrations of Pickerill showing a difference in hardness between the young and the adult tooth, the work of Mummery demonstrating nerves, of Mallesson showing translucent areas, and of Fish showing lymphatic drainage in enamel, indicate distinctly that there may be a vital aspect in dental caries, and that the tissues may be modified, even throughout life, by diet, though not sufficiently by a long way to counteract the external and direct destructive influences of food.—W. H. Gilmour, in *Brit. Dent. J.*

Disease of Japanese Children During Dentition: The American Journal of Diseases of Children abstracts an article by Hirai, from the *Bulletin of the Oriental Child Health Association*, entitled "A Disease Peculiar to Japanese Children at the Time of Dentition Caused by Lead-Poisoning from the Face Powder Used by the Mothers," as follows: This disease is one of the chief causes of infant mortality in Japan and has been prevalent for the last 200 years. The clinical symptoms are vomiting, bloody diarrhea,

convulsions and jaundice. The usual age of onset is 8 months, and the disease is more prevalent in hot weather, owing to the increased use of face powder. Death usually results, and considerable lead is found in the body postmortem. The source is always traceable to the white powder used by the mother.

Surgical Treatment of Rebellious Neuralgias: The author (De Lamothe, in *Presse med.*) describes his method of treating neuralgias localized to the distribution of the superior maxillary nerve. The procedure consists of a removal of the nerve from the inferior orbital foramen to the base of the skull. The operation is entirely intraoral and is carried largely under local anesthesia. The technic involves a removal of the anterior wall of the maxillary sinus through an intraoral incision and a gradual removal of the canal lying in the roof of the sinus in which the maxillary nerve courses. This permits the nerve to drop down free in the sinus whence it is picked up and torn away from its attachment to the main ganglion. Up to the moment of the actual tearing away of the nerve, the anesthesia is entirely local. At this moment a whiff of gas is given. The results are satisfactory and the only danger is that of infection of the orbital tissues from the sinus. If the sinus is carefully drained and if a careful prophylaxis of the mouth precedes the operation, the author believes there is no great danger. A description of the points of anatomic interest is given in quite some detail and the technic of the different steps is also detailed. The author has operated an five patients with varying success. He believes the results have not been watched for a sufficiently long period of time to pass a final opinion. He recommends, however, the operation he describes, for it is not so radical as the serious intracranial operations performed for this condition, while it is at the same time much more radical than the simpler methods of injection.—Abstr. *Am. J. Surg.*, June, 1927.

Lister: So much of our attention is riveted on his greatest work that we are apt to forget Lister's contributions to operative surgery. The sense of security which he derived from the control of wound infections permitted him to introduce many new procedures. In 1883 he reported seven successful cases of wiring of fracture of the patella, though the first operation of this kind was done by his former assistant Cameron in 1877. Fracture of the olecranon was similarly treated. He was the first to do an extensive operation on cancer of the breast, based on anatomical and pathological principles and approximating the modern perfected procedure. He justified the operative treatment of non-union or mal-union of fractures. He re-introduced supra-pubic cystotomy, which had lost favor in comparison with cutting for stone through the perineum. He formulated useful modifications of old methods of amputation, especially at the hip joint, based on careful and deliberate technic which were now made possible by anesthesia and antisepsis. He was fertile in inventing new instruments and apparatus, many of which are in daily use now and are called after him.—David Cheever, in *Boston M. & S. J.*, June 16, 1927.

Periapical Tooth Infection: A roentgen examination alone is not sufficient to make a diagnosis of dental conditions. The physical condition of the patient and his susceptibility to streptococci infection should be recognized. A very careful study is required and every case must be individually considered. While an infected tooth is a menace to health, it should be remembered that the conservation of healthy, useful teeth for proper mastication of food is of great importance, especially to the sick. Teeth, therefore, should not be sacrificed through careless diagnosis, and when certain ones must be extracted proper reconstruction of the mouth by hygienic bridges or dentures should be planned.—Kurt H. Thoma, in *Boston M. & S. J.*

Lingual Neuritis: Dr. Polus has communicated to the Societe belge de stomatologie several cases of pain in the back and tip of the tongue. In all, he found an infected lower wisdom tooth. Extraction of the tooth effected a cure in from four to eight weeks.—Belgian Letter, *J.A.M.A.*

Bismuth Stomatitis: It is well-known that bismuth preparations, like mercury, can give rise to stomatitis. Special attention has been given in French literature to this result of bismuth treatment for syphilis, and some excellent accounts of the condition have appeared in French journals. Dr. Anwyl-Davies, in an article on "Bismuth in the Treatment of Syphilis," which appeared in the *Lancet*, for January 22, gives a good account of the various forms of intolerance

to bismuth. A blue line on the gums is one of the first and most valuable signs that the limit of tolerance to bismuth has been reached. At first there is a grey line which turns to a greyish-blue color. Dr. Anwyl-Davies states that even when the line turns definitely blue the administration of bismuth need not be stopped, but the dosage should be reduced. If stomatitis develops the injections of bismuth should be stopped, as the action of the drug is cumulative. According to L. W. Harrison, the appearance of the blue line occurs more frequently when using the soluble compounds. In some cases of severe bismuth poisoning the blue line may be absent. Dr. Anwyl-Davies has noted the occurrence of Vincent's angina in four cases as a sequel to the injection of bismuth. It was not preceded by a blue line, but the condition would not respond to treatment until the administration of bismuth had been stopped. He states that patients receiving bismuth are more prone to Vincent's angina than usual. It is probable in such cases, as some of the French writers have pointed out, that both bismuth and mercury act by lowering the resistance of the oral mucosa in some way, and that both bismuth and mercurial stomatitis are in reality due to a fuso-spirillary infection, indistinguishable in its clinical aspects from Vincent's angina.—*Brit. Dent. J.*, February 1, 1927.

Treatment of Cancer: Before the National Academy of Medicine, Dr. Belmiro Valverde, who has just returned from France, described the work now being done by a Brazilian scientist, Dr. Calos Botelho, Jr., at the Hotel Dieu Cancer Laboratory of Paris. After devising his test, Botelho is now working on the local treatment of ulcerative cancer with the H. B. (Hartmann-Botelho) solution. This preparation, while destroying cancer cells, does not attack healthy tissue. It also has a great hemostatic, antiputrescent and disinfecting power. The treatment so far is purely palliative, but improves local conditions and lengthens the patient's life. Botelho is also experimenting with a serum obtained from horses in which human tumors have been grafted by a special method. In some cases there has been improvement under this treatment. In a case of epithelioma of the tongue with an enormous carotid gland enlargement, the adenopathy subsided after a course of injections.—Rio De Janeiro letter, *J.A.M.A.*

Roentgenotherapy of Trigeminal Neuralgia: Breitlander (*Zentralb. f. Chir.*) describes the practice of the Rostock University surgical clinic. The gasserian ganglion alone is irradiated. The technic comprises 182 kilovolts, 4 milliamperes, filtration through 0.5 mm. of zinc plus 1 mm. of aluminum, focal distance of 30 cm., diameter of field of irradiation, 5 cm. The dose on the field of irradiation is 30 per cent; the focal dose at the ganglion from about 10 to 15 per cent of the erythema dose. This treatment is repeated as found necessary, usually once or twice even in the most successful cases. An interval of four weeks is allowed to elapse between irradiations. When repetition of the irradiation is contraindicated because of danger of injury to the skin, an effort is made to reach the ganglion from the other side. Fifty-seven cases have been treated in this manner, and Breitlander maintains that it is the safest method of treating trigeminal neuralgia. Patients should be warned that during the first twenty-four hours the reaction—increase in the pain—will be severe.—Abstr. *J.A.M.A.*, April 30, 1927.

Anesthetics in Dentistry: A consideration of the cases of convulsions during ether anesthesia, to which some reference has been made in these columns, suggests the necessity for a review of the methods in common use for producing anesthesia for dental purposes. Where only a few teeth are to be extracted, nitrous oxid or local injections are all that we need. In the case of very young children, ethyl chloride is preferred by many, and in experienced hands it is certainly a valuable anesthetic, though it would appear to be attended by more risks than is nitrous oxid. In cases where buried roots or impacted teeth have to be removed, there is much to be said in favor of blocking the main nerve of supply, though here, again, considerable skill, experience and a complete knowledge of anatomy is essential for success.

The cases where some doubt may arise as to the most suitable method of procedure are those where a large number of septic teeth have to be extracted. Broadly speaking, there are three methods by which this may be done. Firstly, nitrous oxid may be administered on several separate occasions; secondly, double mandibular and double superior maxillary regional injections may be made; and, thirdly, ether may be administered and

all the teeth extracted at the same operation. There are advantages and disadvantages connected with all these methods. There are many patients who are able to screw themselves up to a single anesthetic, but are quite unable to face a whole series of such events. To this type of patient, the gradual method by means of nitrous oxid woud be extremely unpleasant. On the other hand, in cases where there is considerable dental sepsis, and especially where secondary lesions, such as acute iritis, exist, the danger of severe autointoxication is considerably reduced if each operation is limited to the extraction of two or three teeth. When large numbers of teeth are extracted at one operation, either by means of regional anesthetic or ether, a nursing home or hospital is obviously essential. From the operator's point of view, this is, perhaps, an advantage, though many are difficult to persuade on this point. To sum up, it is impossible to lay down any rule as to which is the best method of procedure in any particular case. Each individual case must be considered from every point of view before a decision is made. The particular wishes of the patient should receive every consideration. The general state of the patient's health, the local conditions in the mouth, the facilities available for proper nursing, the skill and experience of the anesthetist available; all these points must be considered and weighed, the correct ultimate decision depending on a careful study of the whole case from every point of view.—*Dent. Surgeon,* June 11, 1927.

Woman as Medical Student: Women compose approximately 6.2 per cent of the graduating classes of the University of Michigan Medical School. Seventy-six per cent of these women and 40.2 per cent of the men have received their premedical education in institutions other than the University of Michigan. Eighty-four and eight-tenths per cent of the women and 44.1 per cent of the men have presented bachelor degrees for entrance. Practically as many women (73.8 per cent) graduate from medicine in proportion to those entering medicine as male students (76.8 per cent). Curtis (*Bull. Ass'n American M. Coll.*) asserts that female students in medicine do better work the first two years than do men, and their work the last two years is about equal to the male student's work. The average woman student in medicine is numerically about 10 per cent better student than the average male student. Students, both male and female, do better if they have received enough premedical preparation to award them a literary degree.—Abstr. *J.A.M.A.*, April 30, 1927.

More Clinical Teaching in Medical Schools: Cabot (*Bull. Ass'n American M. Colleges*) says we spend most of four years in teaching scientific method and scientific approach in which the laboratory animal is an important factor. Hardly anywhere do we even attempt to teach methods of approach and understanding of human beings. It is not, therefore, surprising that the recent graduate, as exemplified by the intern, is likely to approach his patient as if he were simply an enlarged and unreasonable laboratory animal. . The fact that the patient is human, that his relation to the physician will be importantly affected by that physician's approach and attitude of mind are lost sight of, and this importantly impedes the ability of the recent graduate to get in any relation to his patients which is likely to lead to their understanding. This, Cabot thinks, springs directly from the disproportionate teaching of laboratory method, and from the belief which has been voiced by eminent authority that the method of approach of the clinician to his patient should in no particular differ from that of the scientist to his laboratory animal. This attitude has become a very real one in the modern medical student and is importantly responsible for the fact that the community does not always find them sympathetic attendants or sound advisers. If we are, in fact, engaged in the business of preparing people for the practice of medicine, Cabot continues, they must have longer and more intimate contact with the subject of their study. They must be better prepared to understand the intricacies of the human mind. This can best be achieved by the extension into an earlier period of the curriculum and absorption of a large proportion of their time in actual contact with human beings and by methods which will lead to the appreciation of the fact that they are human.—Abstr. *J.A.M.A.*, April 30, 1927.

Announcements

CALENDAR OF MEETINGS*

NATIONAL SOCIETIES

American Association of Dental Schools, March 26-28, 1928, Washington, D. C.

American Society of Orthodontists, April 30-May 1-3, 1928, Buffalo, N. Y.

STATE SOCIETIES

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June inclusive.

January (1928)

Rhode Island, at Providence (11-13).

March (1928)

Louisiana, at Shreveport (8-10).
Montana, at Missoula (29-31).

April (1928)

Alabama, at Mobile (10-12).
California, at Stockton (9-12).
Connecticut, at New Haven (11-13).
Kansas, at Topeka.
Kentucky, at Louisville (3-5).
Maryland, at Baltimore (April 30-May 2).
Michigan, at Detroit (17-19).
New Jersey, at Asbury Park (18-21).
North Carolina, at Charlotte (16-18).
Oklahoma, at Tulsa.

May (1928)

Arkansas, at Little Rock (14).
Illinois, at Rock Island (8-10).
Indiana, at Indianapolis (21-23).
Iowa, at Des Moines (1-3).
Massachusetts, at Boston (7-11).
Missouri, at Kansas City (14-17).
Nebraska, at Lincoln (14-17).
New York, at Syracuse (16-18).
Pennsylvania, at Altoona (15-17).
South Carolina, at Myrtle Beach (21-23).
South Dakota, at Aberdeen (15-17).
Tennessee, at Nashville.
Vermont, at Burlington (23-25).
West Virginia, at Parkersburg (14-16).

June (1928)

Georgia, at Atlanta.
Idaho, at Boise.
New Hampshire, at North Conway (13-15).
Southern California, at Long Beach (7-9).
Texas, at El Paso (5-7).
Wyoming, at Casper.

July (1928)

Wisconsin, at Milwaukee.

December (1928)

Ohio, at Toledo (4-6).

Chicago Dental Society, at Chicago, January 24-26, 1928.

MEETINGS OF STATE BOARDS OF DENTAL EXAMINERS

Delaware, at Wilmington, January 18-19, 1928. Secretary, W. S. P. Combs, Middletown, Delaware.

Montana, at Helena, January 9-13, 1928. Secretary, T. P. Regan, Helena, Montana.

North Carolina, at Raleigh, January 9, 1928. Secretary, H. L. Keith, Murchison Bldg., Wilmington, North Carolina.

North Dakota, at Fargo, January 10-14, 1928. Secretary-Treasurer, Gilbert Moskau, Grand Forks, North Dakota.

*Announcements must be received by the ninth of the month in order to be published in the forthcoming issue of **THE JOURNAL.**

Oklahoma, at Oklahoma City, January 9, 1928. Secretary-Treasurer, Charles A. Hess, Idabel, Oklahoma.

South Dakota, at Sioux Falls, January 9, 1928. Secretary, G. G. Kimball, Mitchell, South Dakota.

IOWA STATE DENTAL SOCIETY

The sixty-sixth annual meeting of the Iowa State Dental Society will be held in Des Moines, May 1-3, 1928. Roscoe H. Volland, President of the American Dental Association, will be the guest of honor at the banquet on Wednesday evening, May 2.

JOHN SCHOLTEN, *Secretary*,
Cedar Rapids, Iowa.

LOUISIANA STATE DENTAL SOCIETY

The next meeting of the Louisiana State Dental Society will be held in Shreveport, at the Hotel Youree, March 8-10, 1928.

M. F. JARRELL, *Secretary*,
Commercial Bank Bldg.,
Alexander, La.

MICHIGAN STATE DENTAL SOCIETY

The next meeting of the Michigan State Dental Society will be held in Detroit, April 17-19, 1928.

WILLIAM R. DAVIS, *Secretary*,
Lansing, Mich.

RAYMOND L. GIRARDOT, *Chairman*,
Program Committee,
1411 Stroh Bldg.,
Detroit, Mich.

MINNESOTA STATE DENTAL ASSOCIATION

(Cancellation of 1928 Meeting)

Owing to the fact that the American Dental Association will hold its next annual meeting in Minneapolis, the Minnesota State Dental Association has decided to cancel its meeting for 1928.

R. G. KEYWORTH, *Secretary*,
1048 Lowry Bldg.,
St. Paul, Minn.

NEW HAMPSHIRE DENTAL SOCIETY

The fifty-first annual meeting of the New Hampshire Dental Society will be held at the Hotel Randall, North Conway, June 13-15.

HARRY L. WATSON, *Secretary*,
Manchester, N. H.

THE NEW JERSEY STATE DENTAL SOCIETY

The fifty-eighth annual meeting of the New Jersey State Dental Society will convene in the Berkeley-Carteret Hotel, Asbury Park, April 18-21, 1928. Essays will be presented on Wednesday and Thursday, and clinics Wednesday, Thursday and Friday.

A. E. BOICE, *Chairman*,
Publicity Committee.

EASTERN DENTAL SOCIETY OF THE CITY OF NEW YORK

A meeting of the Eastern Dental Society of the City of New York will be held, February 2. Theodor Blum will be the essayist, and his subject is "Clinical Oral Surgery Dealing with Etiology, Diagnosis, Differential Diagnosis, Treatment, Prognosis and Pathology." There will also be a series of clinics dealing with oral surgery.

AARON GOLDMAN, *Chairman*,
Executive Committee,
308 Broom St.,
New York City.

DENTAL SOCIETY OF THE STATE OF NEW YORK

The Dental Society of the State of New York will hold its sixtieth annual meeting at Hotel Syracuse, Syracuse, May 16-18. A cordial invitation is extended to all members of the American Dental Association. Exhibitors, please address Daniel Jutton, Chairman, 405 E. Fayette St., Syracuse. For further information, address

A. P. BURKHART, *Secretary*,
57 E. Genessee St.,
Auburn, N. Y.

OHIO STATE DENTAL SOCIETY

The next annual meeting of the Ohio State Dental Society will be held in Toledo, Dec. 4-6, 1928.

E. C. MILLS, *Secretary*,
255 East Broad St.,
Columbus, Ohio.

SOUTH CAROLINA STATE DENTAL ASSOCIATION

The next meeting of the South Carolina State Dental Association will be held at Myrtle Beach, May 21-23, 1928.

T. C. SPARKS, *Secretary*,
Room 402, State Office Bldg.,
Columbia, S. C.

SOUTH DAKOTA STATE DENTAL SOCIETY

The forty-sixth annual session of the South Dakota State Dental Society will be held at Aberdeen, May 15-17, 1928.

CARL FOSSUM, *Chairman*,
Executive Committee.

SOUTHERN CALIFORNIA STATE DENTAL ASSOCIATION

The next annual meeting of the Southern California State Dental Association will be held at Long Beach, at the Virginia Hotel, June 7-9, 1928.

CHARLES M. ALDERSON, *Secretary*,
1007 Edward and Wildey Bldg.,
Los Angeles, Calif.

VERMONT STATE DENTAL SOCIETY
(A Correction)

The next meeting of the Vermont State Dental Society will be held in Burlington, May 23-24, 1928.

R. D. JENNY, *President*,
Bennington, Vt.
L. C. TOBINSON, *Secretary*,
Morrisville, Vt.

DELTA SIGMA DELTA FRATERNITY

The Chicago Auxiliary of the Delta Sigma Delta Fraternity will hold its midwinter meeting and dinner at the Hotel LaSalle, Monday, Jan. 23, 1928, with a business meeting at 5 p. m., and dinner at 6:30 p. m., followed by high class vaudeville entertainment. Those expecting to attend should send their reservations to

E. W. EDLUND, *Scribe*,
Maywood, Ill.

PLINY G. PUTERBAUGH, *Grand Master*.

NOTE—This meeting will be held the Monday evening preceding the beginning of the Midwinter Clinic of the Chicago Dental Society. Please arrange your plans accordingly.

THE BALTIMORE MIDWINTER CLINIC

The third annual Baltimore Midwinter Clinic will be held at the Belvedere Hotel, Friday and Saturday, Feb. 3-4, 1928.

Herman E. S. Chayes, New York City, will give a clinic on "Movable Removable Bridgework, Its Principles and Its Technic." John J. Posner, also of New York, will give a clinic on "Local Anesthesia Simplified," and Albert L. LeGro of Detroit, on the "Porcelain Jacket Crown." A fourth clinician is to be selected. The number subscribing to the clinic is limited to 200, and the fee is $15.00. Any member of the American Dental Association is welcome to subscribe. Applications are accepted in the order in which they are received until the list is closed. Make checks payable to Ethelbert Lovett, treasurer, and mail to George B. Jersin, chairman of the membership committee, Medical Arts Building, Baltimore, Md.

JAMES H. FERGUSON, JR., *Chairman*,
Midwinter Clinic.

DENTAL ALUMNI ASSOCIATION OF STATE UNIVERSITY OF IOWA

The annual meeting of the Dental Alumni Association of the State University of Iowa will be held, Monday and Tuesday, February 20-21, at the College of Dentistry, Iowa City.

RAY V. SMITH, *President*.
ERLING THOEN, *Secretary*.

INFORMATION WANTED

A committee from the American Association of Dental Schools desires "to secure data and information on the subject of children's dental service, to compile tables relative to results obtained." In addition please state when the clinic was established, under what affiliation, the operative policy and the age limit for admission and dismissal The committee is to report, March 29, and will appreciate and acknowledge any material submitted.

FRANK A. DELABARRE, *Chairman*,
520 Beacon Street,
Boston, Mass.

Dec. 5, 1927.

STATE UNIVERSITY OF IOWA, ALUMNI ASSOCIATION OF THE COLLEGE OF DENTISTRY

Following is the tentative program for the meeting of the Alumni Association of the College of Dentistry of the State University of Iowa, to be held at Iowa City, February 20-21: three lectures, "Additional Data Revealing Further the Inefficiency of Present Methods of Dental Practice;" "Newer Knowledge of Calcium Metabolism and the Forces Involved in Tooth and Bone Formation and Their Diseases;" Practical Application of the Newer Data Regarding Calcium Metabolism in the Prevention of Dental Caries and Pyorrhea;" by Weston A. Price, Cleveland, Ohio. A testimonial dinner will be given, Monday evening, February 20, under the auspices of the alumni, faculty and student body of the College of Dentistry, in honor of the dean, Frank T. Breene, in recognition of his extended and efficient service to the college.

W. R. KINZER
Grinnell
D. L. CRISSINGER,
Lake City
L. M. FITZGERALD
Dubuque
Executive Committee

CHICAGO ALUMNI CHAPTER OF PSI OMEGA

The Chicago Alumni Chapter of Psi Omega Fraternity will hold its annual meeting during the Chicago Dental Society Midwinter Clinic at the Drake Hotel, January 24-26. All Psi Omegas attending the meeting will please register in Room 156. Plan on attending the dinner, Friday evening, January 26.

S. A. HUTT, *Sec'y-Treas.*

MARQUETTE UNIVERSITY DENTAL ALUMNI ASSOCIATION

The Marquette University Dental Alumni Association will meet in Milwaukee, Feb. 15-17, 1928.

G. G. BAUMGARTNER, *Secretary*,
1081 Third St.,
Milwaukee, Wis.

STATE OFFICERS CONFERENCE

The annual conference of state officers will be held at the office of the American Dental Association, 58 E. Washington St., Monday, Jan. 23, 1928. The meeting will convene at 9:30 a. m., and reading of the official papers will begin promptly at 10. A most interesting program is being prepared, and it is hoped that every state president and secretary will attend. Last year's conference was productive of great good. This year, the Board of Trustees are invited to attend the meeting, which will greatly add to its interest.

ROSCOE H. VOLLAND, *President.*
HARRY B. PINNEY, *Secretary.*

RESOLUTIONS ON THE DEATH OF DR. ROSS

To the Officers and Members of the Columbus Dental Society:

The Committee named to draft Resolutions on the death of Dr. Albert O. Ross, desires to present the following:

WHEREAS, Dr. Albert O. Ross, an honored member of this Society, was, on July 28,

1927, in his sixty-seventh year, removed from us by death, it is fitting that we should make record of his passing, and of our sense of the great loss thus sustained; therefore, Be it

Resolved, that by his genial disposition, honorable character, his unremitting labor and love for his profession and his associates, he endeared himself to them and won their lasting esteem and affection; that, as a wise counselor, true scholar and skilful operator, he will never again take part in our proceedings; no more will the grasp of his friendly hand be felt; no more will his words of guidance be heard in our deliberations, nor will his cheering smile brighten our gatherings; therefore, be it further

Resolved, that our Society has suffered an irreparable loss; that it extend to his widow in her bereavement our sympathy and condolence; that a memorial page for these resolutions be appropriated in the minutes of this society, and a copy be transmitted to Mrs. Ross and to THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

EDWARD C. MILLS, *Chairman*,
C. W. STROSNIDER,
HARRY COPE,
Committee.

RESOLUTIONS ON THE DEATH OF DR. GRIEVES

WHEREAS, the members of the Baltimore City Dental Society have learned with deepest sorrow of the death of Dr. Clarence J. Grieves, who was taken from this life, Nov. 4, 1927, after a long and useful career of unselfish devotion to the progress of dentistry and

WHEREAS, his scientific researches and service to the profession has been such that we, his confères will continually point to his achievements with pride; his unassuming, affable and genial personality; his high ideals and strong convictions in those principles in which he believed will keep his memory fresh in our minds; dentistry everywhere will cherish his memory, but the influences he has set in motion among his friends in this society will roll on through the long years of eternity; and

WHEREAS, we share the great sorrow that overwhelms his devoted wife, who has so faithfully shared his affections and sorrows, and it is impossible to overhonor the brave heart that has tried so hard during the last few years of his life to shield him from the hurts and cares of an invalid, therefore be it

Resolved, in remembrance of one we loved, that a copy of these resolutions be spread upon the minutes of this society and the secretary be instructed to send a copy to each of the principal journals and to the family of the deceased.

JAMES H. FERGUSON, JR., *Chairman*,
C. ADAM BOCK,
C. T. HAILE,
C. E. MULLAN,
W. R. MERRIAM,
Necrology Committee,
Baltimore City Dental Society.

RESOLUTIONS ON THE DEATH OF DR. MEISBURGER

It is with sincere sorrow that the members of the Dental Educational Council of America have learned of the death of Dr. Louis Meisburger, one of the original members of the Council. In his death, the Council has lost one of its most valued and beloved members; a man who was always in his place when the Council convened and whose intelligent grasp of all subjects and his keen professional insight, made him a member whose loss will be felt as long as the Council endures. "His life was so gentle and the elements so mixed in him, that Nature might stand up and say to all the world, this was a man." He was pure in heart, in mind, in every action and intention, and actuated by the very highest motives in life.

The Council wishes to record his great worth to them and their love for him, and to express to his widow and loved ones the sympathy that actuates the heart of every man.

The committee recommends that a copy be sent to Mrs. Meisburger, placed upon the minutes of the Council, and be published in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION.

J. V. CONZETT,
ALEXANDER H. REYNOLDS,
W. T. CHAMBERS,
Committee.

SOME PACKAGE LIBRARIES*

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Alveolectomy or surgical preparation of the mouth for dentures.
Amalgam fillings and physical properties of amalgam.
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Cavity preparation.
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Children's dentistry.
Condyle path movements.
Diet and nutrition in relation to teeth.
Education of denture patients.
Esthetics in denture construction.
Fixed and removable bridgework.
Focal infection.
Fractures of the jaws.
History and progress of dentistry.
Hospital dental service.
Indirect inlay technic.
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Local anesthesia.
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Preoperative examination of patients.
Prophylactic odontotomy.
School dental clinics.
Surgical treatment of pyorrhea.
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Traumatic occlusion.
Use of elevators in extraction.
Use of face-bow in full denture work.
Vincent's infection.

*These packages are composed of reprints, magazine clippings and small pamphlets. The charge for a package is fifty cents. In response to requests, packages will be compiled on any subject pertaining to dentistry.

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